1-1-2012

Boston_Sound_Center

Michael Frase
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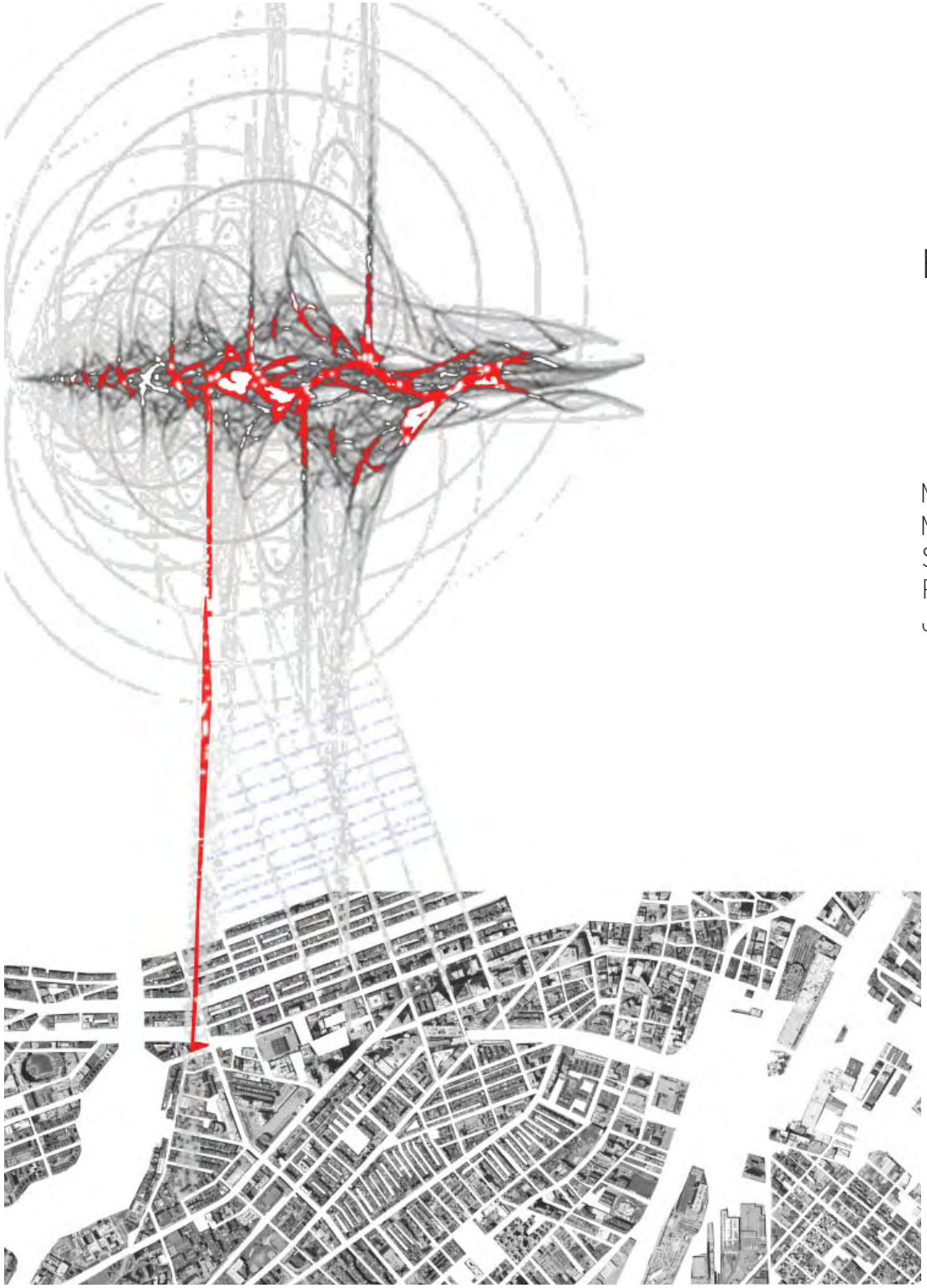


BOSTON_SOUND_CENTER

MICHAEL FRASE
MASTERS OF ARCHITECTURE
S.A.A.H.P
ROGER WILLIAMS UNIVERSITY
JULY 31 2012

SIGNATURE PAGE

TITLE OF THESIS SOUND_SPACE

AUTHOR MICHAEL FRASE _____ DATE_____
[SIGNATURE]

THESIS COORDINATOR ANDREW COHEN _____ DATE_____
[SIGNATURE]

DEAN STEPHEN WHITE _____ DATE_____
[SIGNATURE]

TABLE OF CONTENTS

ABSTRACT

ABSTRACT

THIS THESIS QUESTIONS THE CONNECTION BETWEEN WHAT WE HEAR AND WHAT WE SEE WITH REGARDS TO SPATIAL CONCEPTION. THE PURPOSE IS TO DISCOVER THE IMPORTANCE OF SOUND IN SPATIAL REPRESENTATION AND TO UNDERSTAND THE IMPLICATIONS OF SOUND BASED DESIGN.

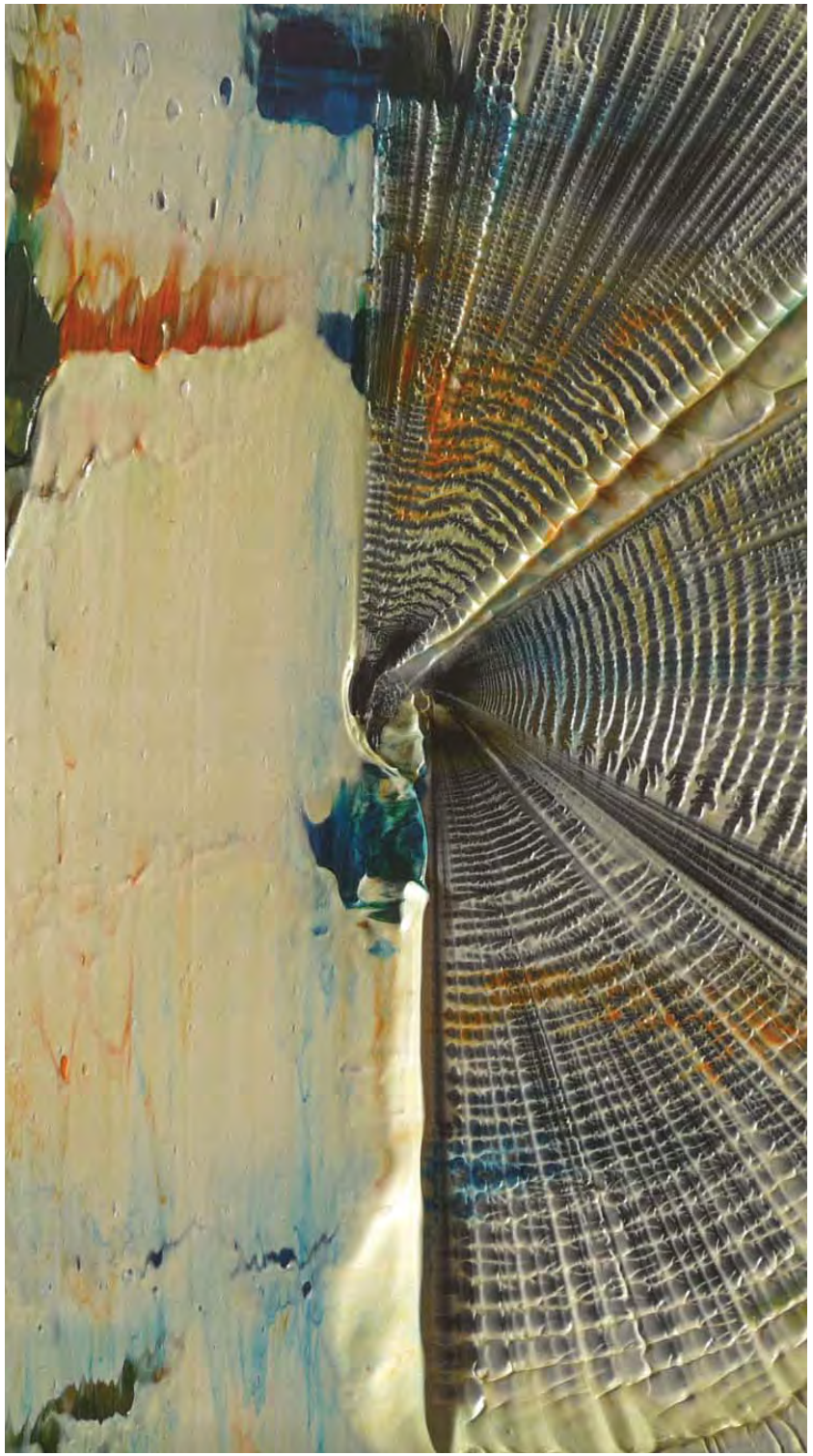
ESSAYS

PURPOSE

THIS THESIS IS A STUDY OF THE RELATIONSHIP BETWEEN AUDITORY AND PHYSICAL COMPOSITIONAL STRATEGIES. THE PURPOSE OF THE STUDY IS TO DISCOVER RELATIONSHIPS BETWEEN THE PHYSICAL ATTRIBUTES OF THE BUILT ENVIRONMENT [SUCH AS FORM, MATERIAL, STRUCTURE AND SCALE AMONG OTHERS] AND THE RESULTING SONIC CHARACTERISTICS.

VISUAL STUDIES ARE PRESENTED AS THE EXCLUSIVE METHOD FOR ARCHITECTURAL DESIGN CONCEPTION AND REPRESENTATION-DESPITE THE RESULTING SPACES BEING COMPOSED OF MORE THAN SIMPLY VISUAL STIMULI. IT IS POSSIBLE TO DISCOVER NEW DESIGN PARADIGMS THROUGH ALTERNATIVE DESIGN PROCESSES INVOLVING ACOUSTIC COMPOSITION. SOUND IS A FUNDAMENTAL COMPONENT OF SPACE. BOTH HISTORICAL AND CONTEMPORARY DESIGN METHODOLOGIES NEGLECT SONIC COMPOSITION AS A CO-GENERATOR OF SPACE. IT IS IMPOSSIBLE TO IGNORE SOUND AS A COMPONENT OF SPACE. VISUAL STIMULI DOMINATE HOW WE COMPREHEND SPACE, BUT WITHOUT MORE INFORMATION IT EXISTS ONLY AS AN ABSTRACT CONCEPTION.

SPACE, A COMPOSITE SENSORIAL REALITY, CAN NOT BE COMPLETELY DESIGNED NOR REPRESENTED THROUGH PURELY VISUAL METHODS. THIS THESIS QUESTIONS THE CONNECTION BETWEEN WHAT WE HEAR AND WHAT WE SEE WITH REGARDS TO SPATIAL CONCEPTION. THE PURPOSE IS TO DISCOVER THE IMPORTANCE OF SOUND IN SPATIAL REPRESENTATION.



PERRY HALL *DECALCOMANIA CYCLE* 8-7-01. ACRYLIC ON PANEL/ 30X30CM

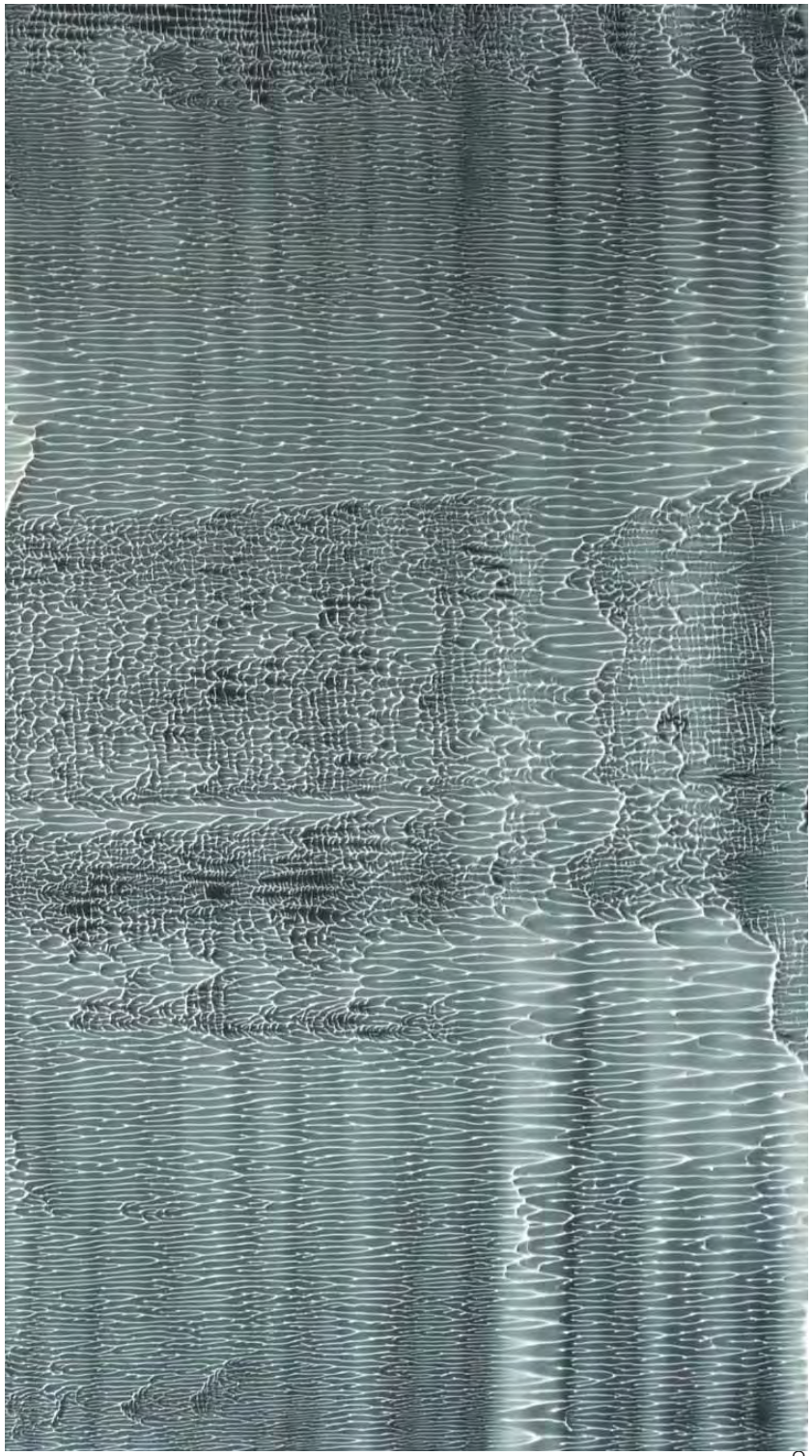
ARCHITECTURE:AN *EXCLUSIVE* DESIGN METHOD

ARCHITECTURE IS THE RESULT OF AN INTENSIVE DESIGN PROCESS. THIS PROCESS HAS CHANGED OVER THE CENTURIES, SEEING INNOVATIONS DURING EVERY MAJOR HISTORICAL EPOCH. THE GENESIS OF ARCHITECTURAL FORMS THROUGHOUT HISTORY HAS LARGELY BEEN CONCEIVED THROUGH VISUAL STUDIES AND EXPERIMENTATION, WHETHER THROUGH THE USE OF PHYSICAL MODELS, COLLAGES, DIAGRAMS OR THROUGH MORE DISCREET VISUAL FORMS SUCH AS THEORIES WRITTEN IN TEXT AND LINE-BASED DOCUMENTATION THROUGH ORTHOGRAPHIC PROJECTIONS.

WHILE VISUAL DESIGN METHODOLOGIES SATISFY THE NECESSITIES OF CONSTRUCTION THEY FAIL TO CAPTURE CRITICAL *SPATIAL* CONDITIONS.

THE DESIGN PROCESS IS AN EXERCISE IN VISUAL ABSTRACTION. BUT SPACE IS NOT SIMPLY A VISUAL ENTITY. SPACE IS A TOTAL SENSORIAL REALIZATION. WHY THEN IS SPATIAL CONCEPTION AN EXCLUSIVELY VISUAL PROCESS?

IT MAY BE BECAUSE OF OUR VISUAL SENSITIVITY, PHYSIOLOGICAL CAPABILITIES, THE ADVANCEMENT OF CERTAIN SENSES THROUGH TIME VIA EVOLUTION. IT IS A CRITICAL PART OF WHAT MAKES US HUMAN.



PERRY HALL *DECALCOMANIA* 9-5-01. ACRYLIC ON PANEL/ 60X60CM

CURTAIN SPHERE

THE CURTAIN SPHERE IS THE SUGGESTED ARCHETYPE FOR OBSERVING THE IMPACT OF AURAL COMPONENTS AS A PART OF SPATIAL PERCEPTION. THEORETICALLY THE SPHERE IS A SPATIAL MACHINE DESIGNED TO ISOLATE THE VISUAL CONTINUITY OF A SPACE BY PROVIDING A SURFACE DEFINED BY MATERIAL THAT REMAINS COMPLETELY OPAQUE AND DENIES THE TRANSMISSION OF LIGHT-BASED VARIATIONS. THIS MATERIAL WOULD INSTEAD ALLOW THE TRANSMISSION OF SOUND.

THE CURTAIN SPHERE WOULD PROVIDE THE MEDIUM FOR AUDIO-BASED SPATIAL REPRESENTATION. FROM THIS SPACE ONE COULD PERCEIVE RHYTHMIC SPACES, DEPTH AND TEXTURE, EXPANSIVE SPACES, PLACES OF POPULATION AND PLACES OF SOLITUDE.

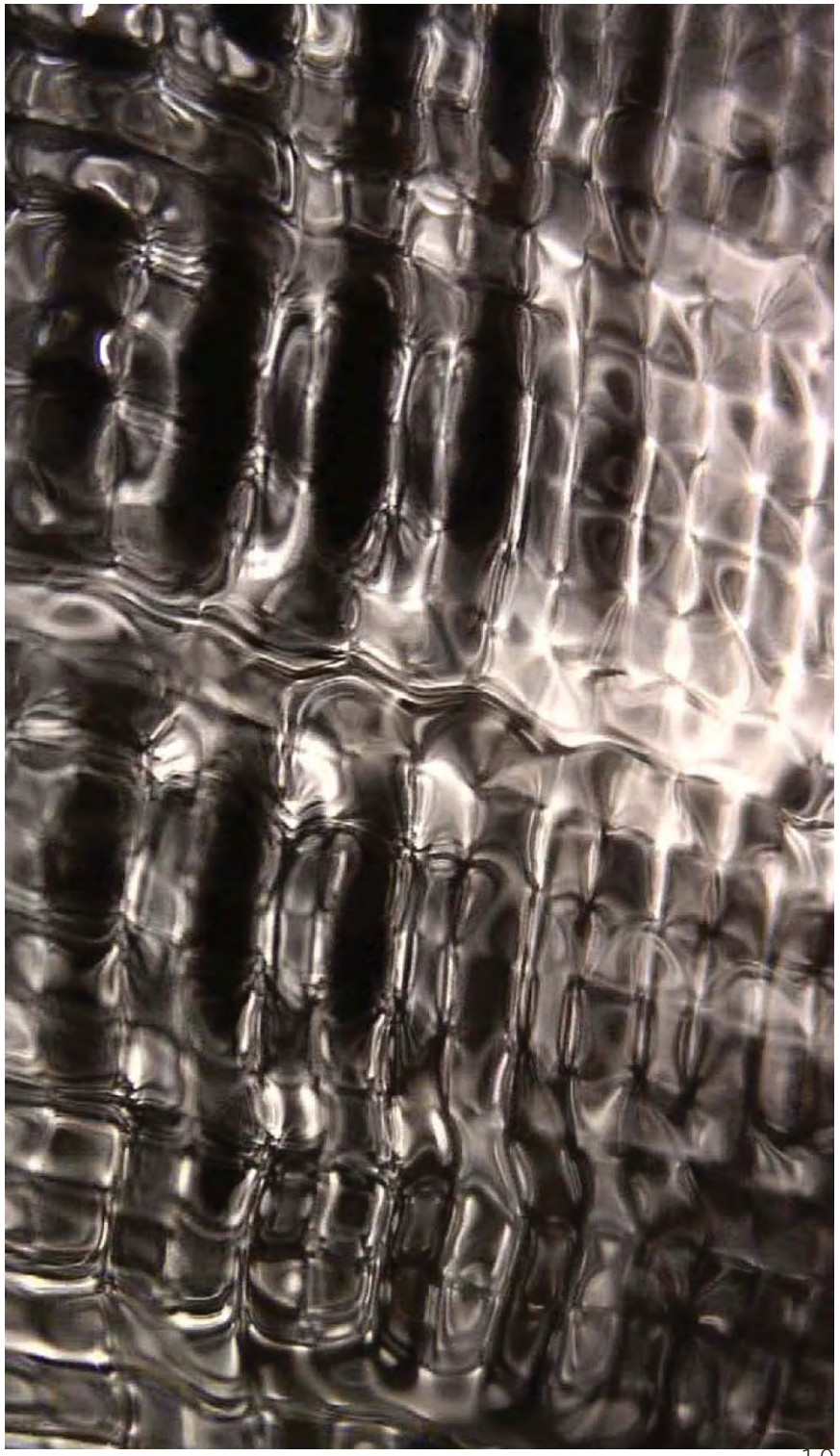
PERRY HALL *DECALCOMANIA CYCLE* 8-1-04,2ACRYLIC ON PANEL/ 61X61CM

AN ALTERNATIVE METHOD: REPRESENTATION

ARCHITECTURAL REPRESENTATION RELIES ALMOST EXCLUSIVELY ON VISUAL MEDIA. THE REPRESENTATION OF SPACE REQUIRES AN ALTERNATIVE METHOD THAT RELIES ON MORE THAN JUST THE VISUAL, BUT ALSO AUDITORY FRAGMENTS.

SPATIAL REPRESENTATION IS AN ATTEMPT TO CAPTURE DYNAMIC SEQUENCES THAT GET IMPRINTED WITHIN OUR MEMORY. AS ONE WALKS THROUGH A BUILDING IT IS THE MOMENTS OF REPOSE AND CONTEMPLATION THAT BECOME PART OF ONE'S HISTORICAL RECORD. THESE MOMENTS ARE CAPTURED IN OUR MEMORY BY DEFINING CHARACTERISTICS. ONE SUCH CHARACTERISTIC IS SOUND.

LIGHT FALLING FROM SOMEWHERE AMONG THE MATERIAL SUSPENDED ABOVE US GIVES THE SENSE THAT SPACE CONTINUES. ECHOES DRIFTING AROUND WALLS FROM SOURCES UNKNOWN GIVE US THE IMPRESSION OF SPATIAL CONTINUITY THAT VISUAL PERCEPTION DENIES. A SPACE THAT IS CLOSED IN A PURELY VISUAL SENSE CAN BE MADE IMMENSE THROUGH THE TRANSMISSION OF CONTRADICTORY AUDIO-BASED LOGICS.



PERRY HALL *SOUND DRAWING*, SOUND MOVING THROUGH PAINT

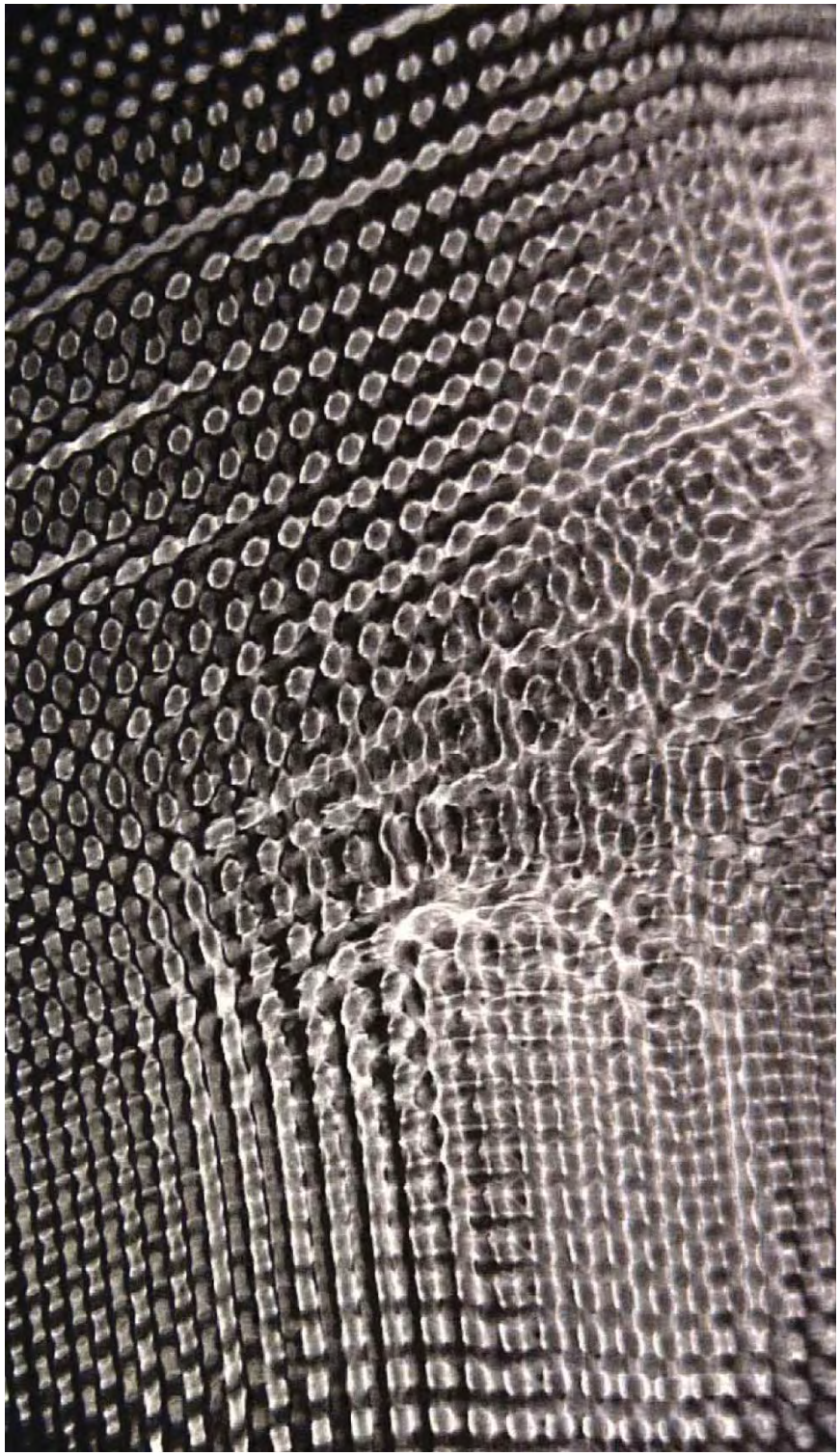
ILLICIT SOUND

THE GOAL OF THIS THESIS IS NOT TO DERIVE BUILDING FORM THROUGH THE ABSTRACTION OF AUDITORY PHENOMENA, BUT INSTEAD TO DESIGN A SOUNDSCAPE, MEANING THAT A VISITOR WILL MOVE THROUGH A SPACE DESIGNED TO MANIPULATE AUDITORY EXPERIENCE AND EXHIBIT THE POTENTIAL OF SPACE DESIGNED TO UNCOVER ACOUSTIC EVENTS.

THIS EXPLORATION WILL BE BASED ON RESEARCH AND ANALYSIS OF ACOUSTIC CONDITIONS FROM THE SITE, TO BUILDING FORM AND PROGRAMMATIC ARRANGEMENT, SYSTEMS INTEGRATION, EMERGING TECHNOLOGIES, DETAILING AND MATERIALS.

THE PRIMARY EXPRESSION OF THIS THEORETICAL DIALOGUE SHALL BE THROUGH A NEW REPRESENTATIONAL METHOD, ONE THAT RELIES PURELY ON SOUND AS A STIMULUS TO PROMOTE THE CREATION OF IMAGERY AND SPACE WITHIN THE MIND.

ARCHITECTURAL REPRESENTATION THROUGH A SONIC MEDIUM, WITH SUPPORTING IMAGERY TO PROVIDE A MORE COMPLEX REPRESENTATION OF AN ENVIRONMENT. THIS FORM OF REPRESENTATION MIMICS A CINEMATIC APPROACH, HOWEVER, THE SEPARATION BETWEEN WHAT YOU HEAR AND WHAT YOU SEE GIVES PAUSE FOR REPOSE, FOR IMAGINATION, FOR CONTEMPLATION AND FOR THE ESTABLISHMENT OF SPATIAL MEMORY.



PERRY HALL *SOUND DRAWING*, SOUND MOVING THROUGH PAINT

MANIFESTO

SPACE [SOUND]

SPACE EXISTS AS A COMBINATION OF LIGHT, SOUND AND MASS. SOUND IS A COMPONENT OF SPACE. SPACE AND SOUND ARE INDELIBLY LINKED. OUR FIRST LANGUAGE WAS AUDITORY- THE VOICES, MUSIC AND BLOOD FLOW THAT PENETRATED THE WOMB. OUR FIRST RHYTHM WAS A BEATING HEART. IMAGERY IS NOT THE MOST FUNDAMENTAL EXPRESSION OF SPACE. IT IS THE MOST CULTURED.

[ ] IS COMPOSED.

[ ] AFFECTS MEMORY.

[ ] ATTAINS MEANING THROUGH SEQUENCE.

[ ] CAN BE ARRANGED AS PART OF A PROCESSION.

[ ] INFORMS EXPERIENCE.

[ ] IMPLIES SPACE AND DISTANCE.

[ ] IS MASSIVE.

[ ] HAS TEXTURE.

[ ] HAS DEPTH.

[ ] EXPRESSES.

[ ] IS A CODIFIED LANGUAGE.

[ ] IS FUNDAMENTAL.

[ ] HAS TRANSITIONS.

[SOUND]

[SPACE]

PROGRAM

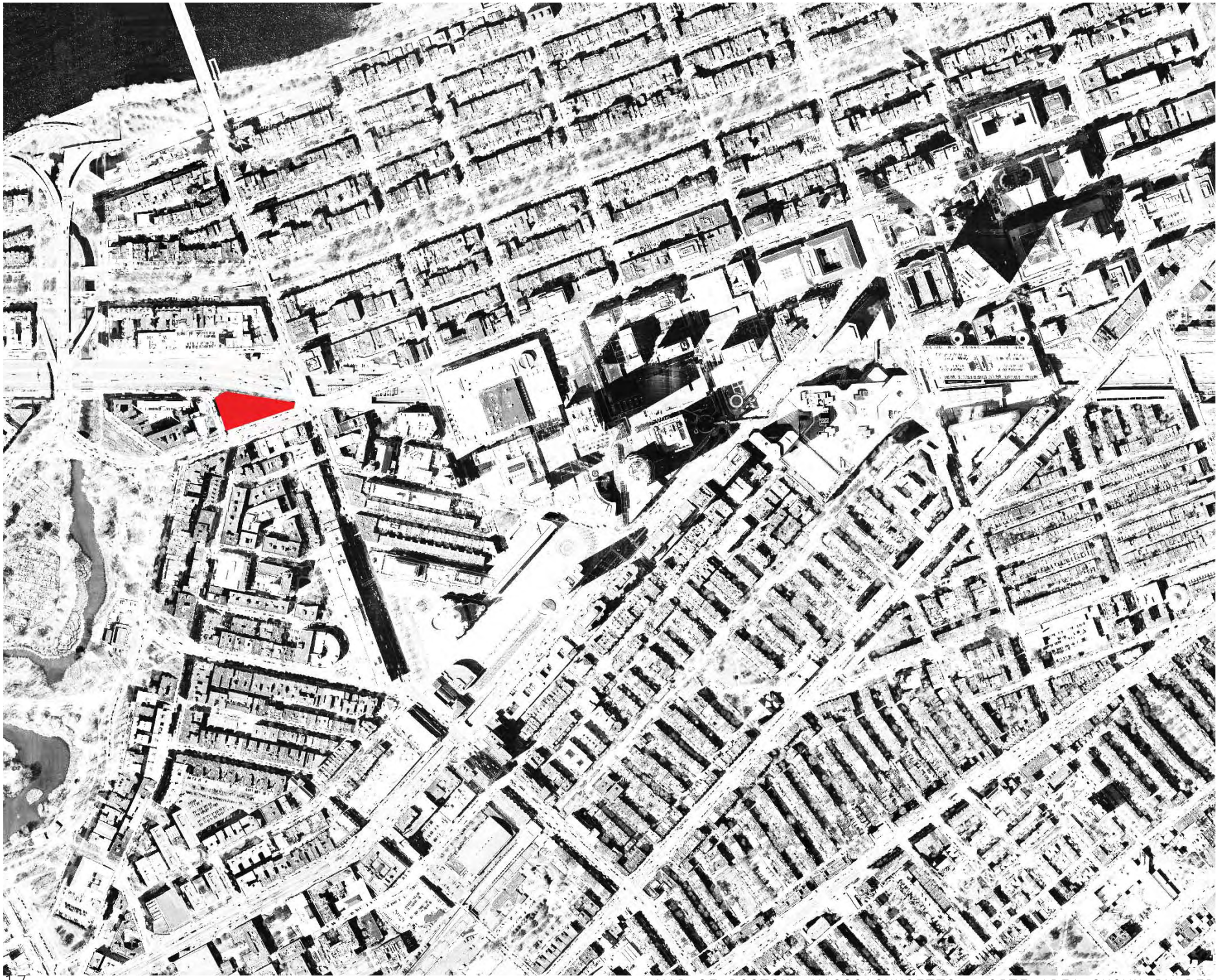
PROGRAM

GALLERY SPACES	
THEATER TYPE	2500
SOUND WALL TYPE	25000
TRADITIONAL TYPE	11000
SPHERE TYPE	5500
CAFE	
SEATING	2000
PREPARATION/STORAGE	1500
LIBRARY	
STACKS	1800
READING AREA	1200
AUDITORIUM	4000
PUBLIC RECORDING STUDIOS	
RECORDING STUDIOS	5000
CLASSROOMS	1000
ACOUSTIC ANALYSIS SPACE	
OPEN OFFICE	4000
ANECHOIC CHAMBERS	9000
OFFICES	1000
MACHINE ROOM	2000
CONFERENCE ROOM	200
ADMINISTRATION	
OFFICES	700
ARCHIVAL SPACE	800
OPEN OFFICE SPACE	1500
CONFERENCE ROOMS	300
STORAGE	14000
TOTAL	94000

SPACES TO WORK WITH SOUND AS A DESIGN MEDIUM. SPACES TO EXPOSE THE ART OF SOUND MAKING. SPACES TO REINTERPRET CONTEXTUAL SOUNDSCAPES. A DISPLAY OF SOUND TO DISCOVER SOUNDFORM. A SPACE TO INSPIRE. A SPACE TO CAUSE CONFUSION, TO BEND NORMALITY. A SPACE TO EXPERIENCE CONTEMPORARY THEORY AND COMPOSITION. A SPACE TO PROVOKE QUESTIONS. A SPACE IN CONSTANT FLUX. A SPACE FOR THE MASSES, FOR THE CURIOUS, FOR THE ENTHUSIAST, SPACE TO EXPLORE FRINGE AESTHETICS/FORM. TO EXPLORE SENSORY AND PROFESSIONAL SYNAESTHETIC. A SPACE TO REINVENT CONNECTIONS AND RELATIONSHIPS BETWEEN PRACTICES. A PLACE TO HYBRIDIZE. A PLACE TO WONDER.

SPACES TO ENGINEER NEW SOUNDS. SPACES TO COLLECT AND ANALYZE SOUND. SPACES TO RESEARCH ACOUSTIC QUALITIES AND CAPABILITIES OF MATERIALS AND ASSEMBLIES. TESTING FACILITIES. PLACES TO RESEARCH AND STUDY. SPACE FOR LECTURES. SPACE TO CONVERSE. SPACE TO INVENT, IMPROVE, INNOVATE, EXPERIMENT, COLLABORATE, WORK, CONTEMPLATE, IMAGINE, DEBATE, DEVELOP, CONCENTRATE, ENVISION. SPACE TO WALK AND CONSIDER. A STRUCTURED ENVIRONMENT. SPACES THAT REMAIN FAMILIAR AND RHYTHMIC. ORGANIZATION AROUND THE INDUSTRY OF SOUND. PLACES TO FINALIZE AND RECORD WORK READY FOR PRODUCTION.

SITE



MAP OF BOSTON, MASSSACHUSETTS. SITE AREA SHOWN IN RED

ACADEMICS

BOSTON IS FAMOUS FOR ITS ACADEMIC INSTITUTIONS. THESE INSTITUTIONS OPERATE ONLY TO EDUCATE AND DEVELOP THE STUDENTS WITHIN THEIR OWN SYSTEMS. WITH THE EXCEPTION OF THE OCCASIONAL LECTURE OR EXHIBITION, ACADEMIC INSTITUTIONS ARE LARGELY INTROVERTED ENTITIES.

THE BOSTON SOUND CENTER SEEKS TO PROVIDE EDUCATIONAL OPPORTUNITIES AND FACILITIES FOR THE PUBLIC. THE CENTER OFFERS RECORDING STUDIOS AND CLASSROOMS IN ADDITION TO A LARGE THEATER FOR INTERNATIONAL SYMPOSIUMS FOR USE BY LOCAL BANDS AND SOUND ENGINEERS WHO LACK THE SPACE OR FINANCIAL MEANS TO START THEIR OWN STUDIO. WHILE THERE ARE MANY ACADEMIC INSTITUTIONS WITH SUCH FACILITIES, THE GENERAL PUBLIC IS DENIED ACCESS TO THEM, MAKING THEM PURELY FOR THE STUDENTS.

THE BOSTON SOUND CENTER IS LOCATED DIRECTLY ACROSS FROM THE BERKLEE COLLEGE OF MUSIC AT THE INTERSECTION OF MASSACHUSETTS AVENUE AND BOYLSTON STREET. THE CENTER IS LOCATED NEAR MANY DIFFERENT SCHOOLS AND LOCAL GALLERIES MAKING IT A FANTASTIC GEOGRAPHICAL NEXUS POINT FOR BOTH THE ACADEMIC AND THE PROFESSIONAL WORLDS.

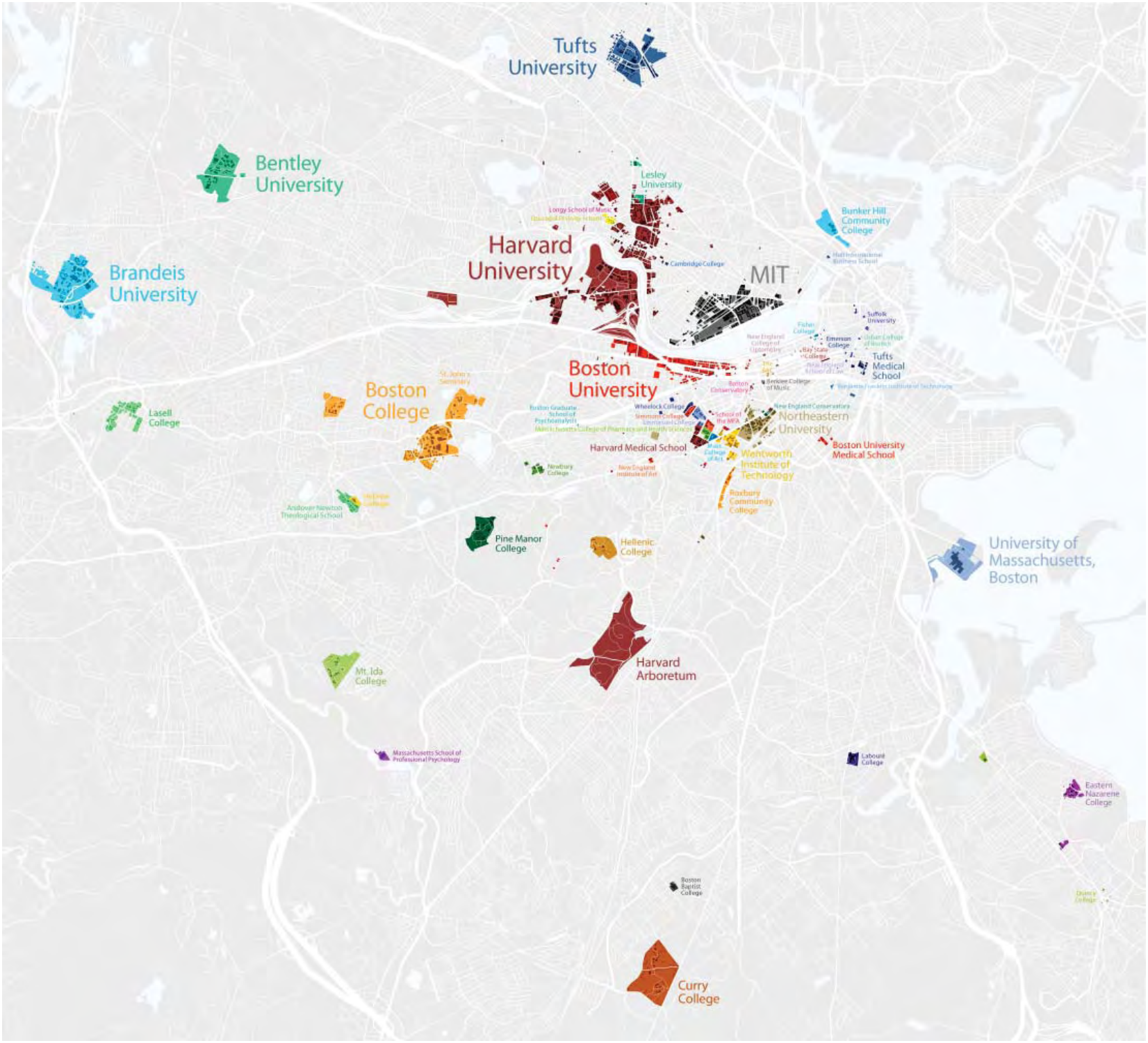


DIAGRAM OF MAJOR UNIVERSITIES IN BOSTON,MASS

ART CULTURE

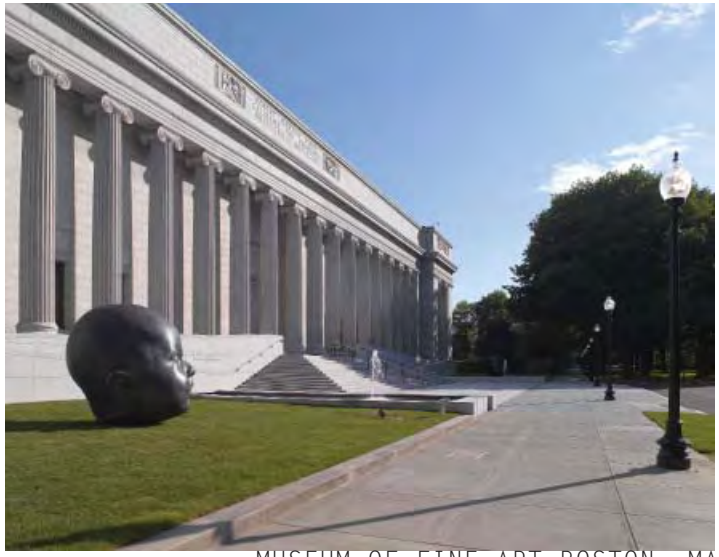
BOSTON HAS A RICH ART CULTURE DRIVEN BY A LARGE NUMBER OF INDEPENDENT GALLERIES AND ARTISTS. THERE ARE ALSO NATIONALLY RECOGNIZED MUSEUMS SUCH AS THE ICA AND THE BOSTON MUSEUM OF FINE ARTS WHICH CREATE INTEREST IN A GROWING ARTIST COMMUNITY. THE BOSTON SOUND CENTER IS LOCATED WITHIN WALKING DISTANCE OF ALMOST 40 LOCAL ART GALLERIES WHICH ARE CONCENTRATED ALONG NEWBURY STREET. THE MAP TO THE RIGHT DEPICTS THE LOCATIONS OF NEARBY GALLERIES.

BOSTON IS ALSO HOME TO A NUMBER OF FANTASTIC CONCERT VENUES. BOSTON SYMPHONY HALL
IS WIDELY REGARDED AS HAVING ACHIEVED NEAR ACOUSTIC PERFECTION FOR ORCHESTRAL PERFORMANCES. THESE ARE VITAL SPACES FOR THE EXHIBITION OF SOUND TO A SELECT AUDIENCE, BUT
FOR THE CASUAL OBSERVER WALKING THE STREET THERE IS NO INTERACTION. THE BSC OFFERS A STREET-SIDE THEATER FOR THE PRODUCTION OF PLAYS AND OTHER PERFORMANCES THAT REACH FAR OUTSIDE THE NORMAL THEATER SPACE AND AFFECT THE STREETSCAPE IN A PURPOSEFUL MANNER.

BOSTON ARTS FESTIVAL

ERNST HALBERSTADT AND HAROLD PLOTKIN STARTED THE ORIGINAL BOSTON ARTS FESTIVAL. IN 2003 THE BOSTON ARTS FESTIVAL WAS REINSTITUTED AS A ONE-DAY EVENT BY MAYOR THOMAS M. MENINO, THE FESTIVAL STARTED WITH THE MISSION OF LAUNCHING THE BOSTON OPEN STUDIOS AND PERFORMING ARTS SEASONS. THE BOSTON ARTS FESTIVAL HAS CONTINUED TO GROW FROM AN HOUR LONG EVENT IN ITS FORMATIVE YEAR TO THREE DAY EVENT SUPPORTED BY ARTISTS AND POLITICIANS ALIKE.

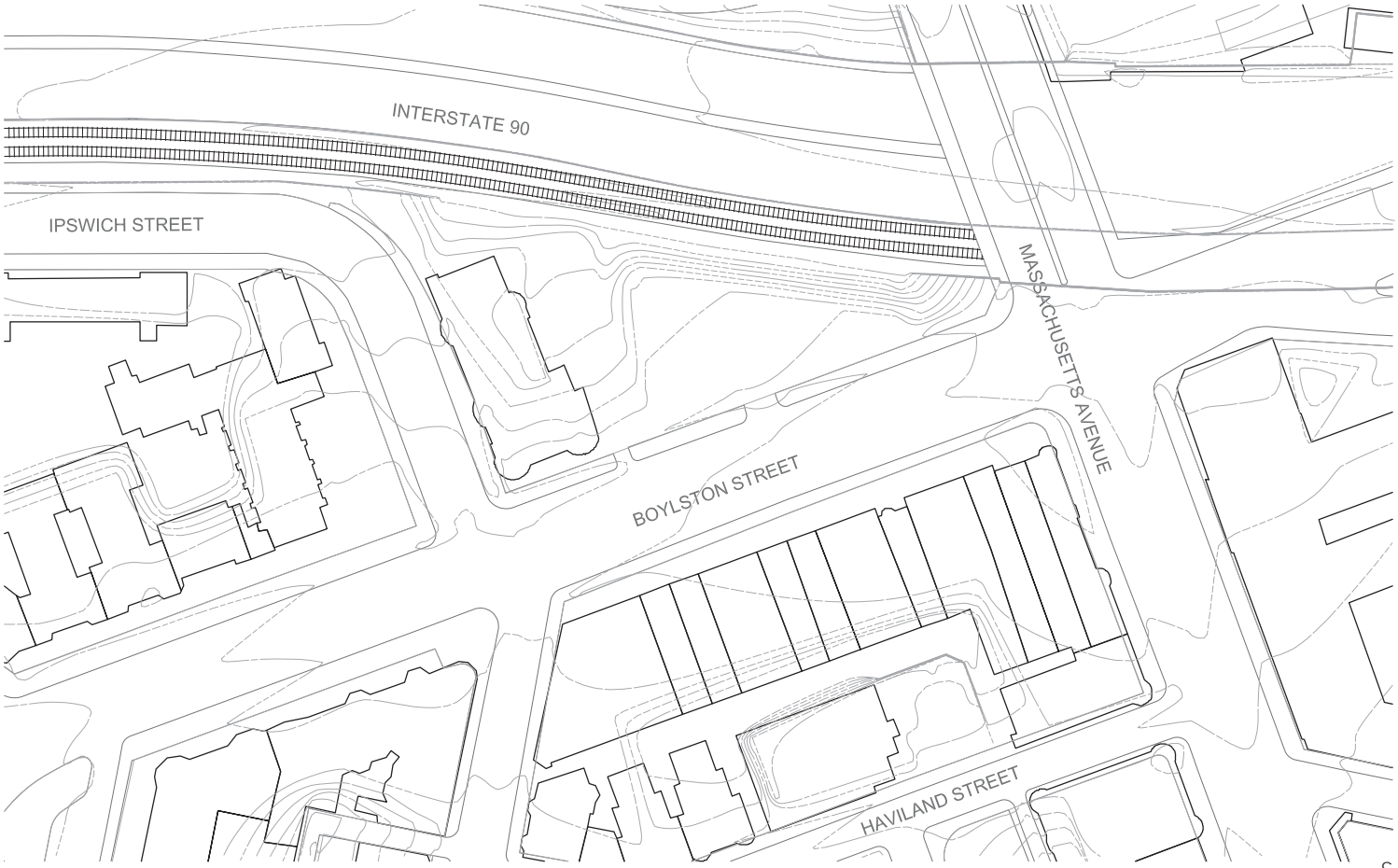
WHILE THE EXISTING ART GALLERIES, PERFORMANCE VENUES AND PUBLIC EVENTS OFFER MANY OPPORTUNITIES FOR ARTISTS AND PATRONS, THERE IS VERY LITTLE EVIDENCE THAT SUGGESTS THE EXISTENCE OF A VENUE LIKE THE BOSTON SOUND CENTER. THE BSC OFFERS A NUMBER OF UNIQUE AUDITORY ENVIRONMENTS THAT TRANSFORM WHAT COULD BE A NORMATIVE MUSEUM EXPERIENCE INTO AN AUDITORY EXPLORATION. THE BSC OFFERS A NONTRADITIONAL VENUE FOR THE PRESENTATION OF SOUND. THE GALLERIES CONSIST OF WHAT ARE ESSENTIALLY SOUND WALLS,MEANING THAT THE ARCHITECTURE HAS ASSUMED THE ROLE OF TRADITIONAL MEDIA OR PROJECTION EQUIPMENT. MANY OF THE SURFACES OF THE BCS' INTERIOR ALLOW FOR ISOLATED, CHOREOGRAPHED SONIC PRESENTATIONS THAT SURROUND AND AFFECT VIEWERS IN A WAY THAT NO OTHER BOSTON VENUE HAS THE POTENTIAL OF DOING.



MUSEUM OF FINE ART BOSTON, MA

INSTITUTE OF CONTEMPORARY ART

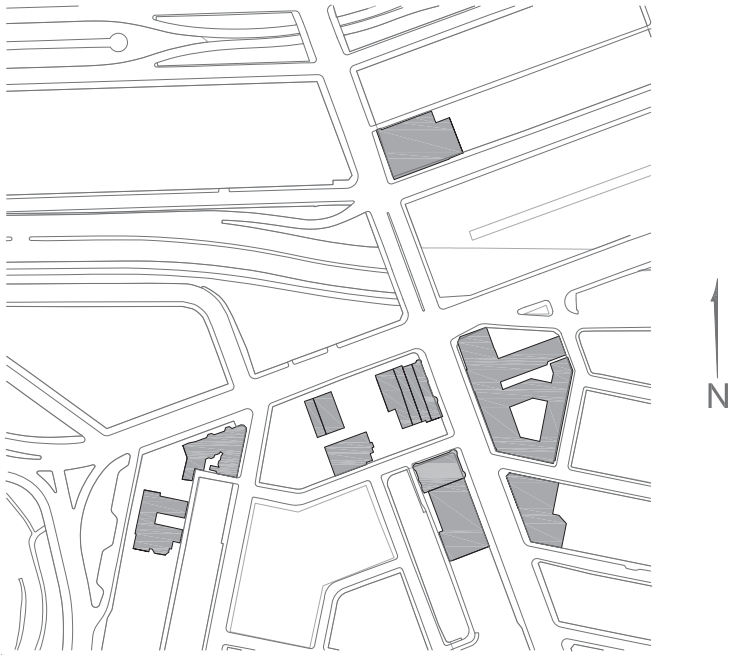
ARTIST GALLERIES CLOSE TO BSC SITE



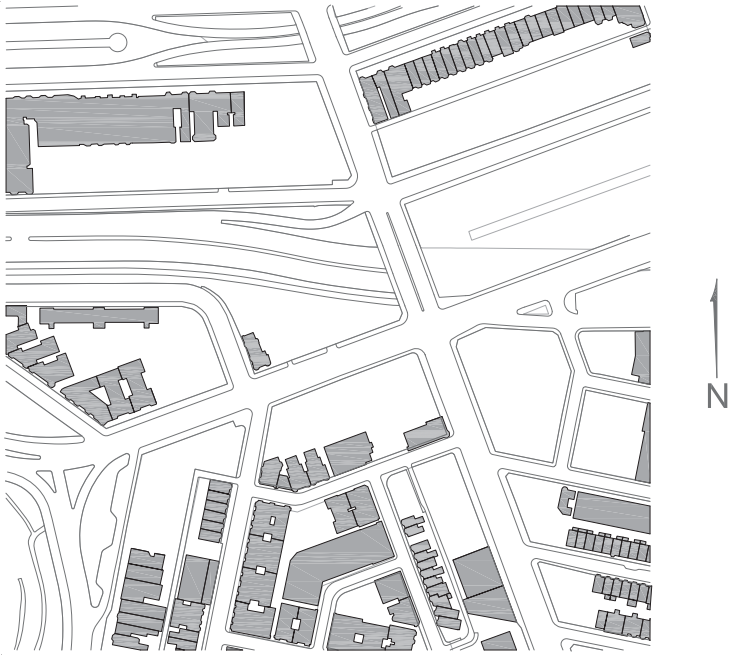
SITE PLAN WITH TOPOGRAPHY

NOTE: THE EXISTING 4 STORY APARTMENT BUILDING WOULD BE TORN DOWN DUE TO THE PHYSICAL CONSTRAINTS OF THE SITE AND THE OVERALL SPATIAL DEMANDS OF THE PROGRAM.

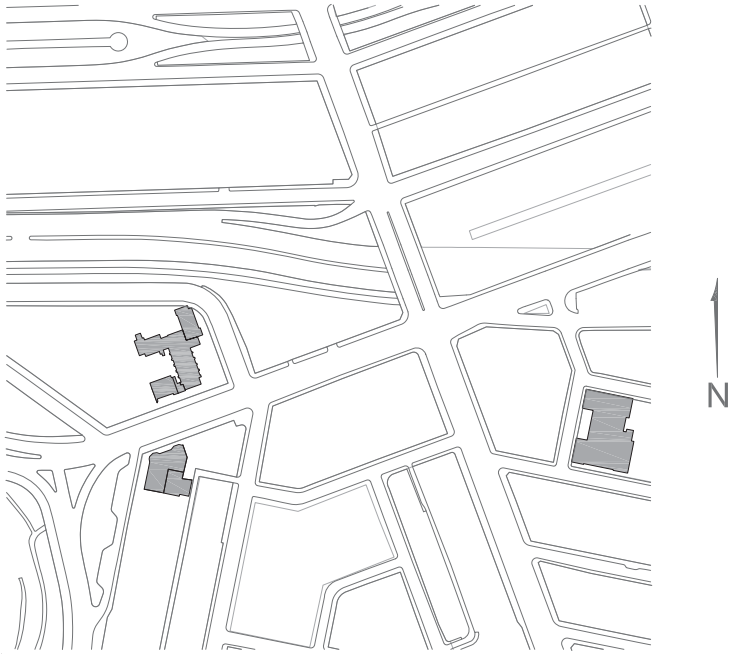
SURROUNDING BUILDINGS: USAGE



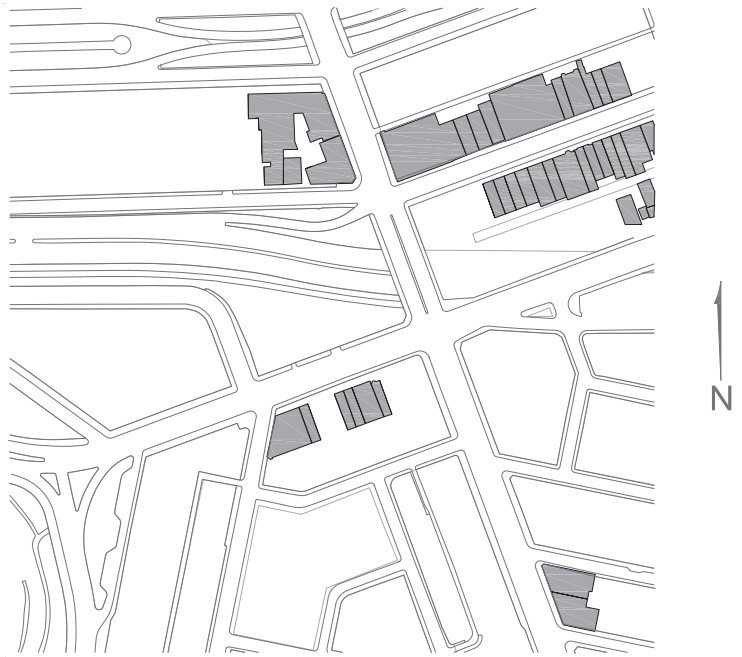
BOSTON CONSERVATORY AND BERKLEE



RESIDENTIAL



RELIGIOUS/HISTORICAL SOCIETY



RETAIL

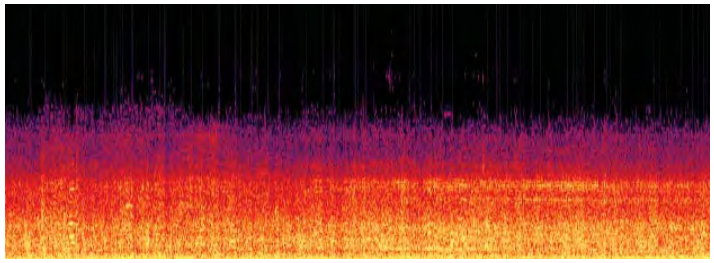
SOUND: I-90

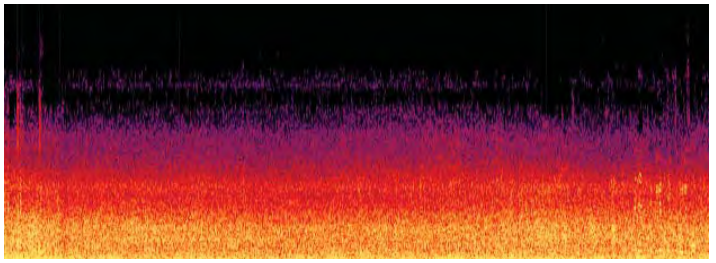
THE SOUND PROFILE OF THE SITE IS UNIQUE IN THE SENSE THAT IT PREVENTS TWO DISTINCT SOUNDSCAPES ON EITHER SIDE OF ITS LONGITUDINAL BORDERS. THE SONIC CHARACTERISTICS THAT FORM THE NORTHERN EDGE OF THE SITE ARE DOMINATED BY INTERSTATE 90. THE TOPOGRAPHICAL SHIFT BETWEEN THE PAVED SURFACE AND THE SITE BOUNDARY IS OCCUPIED BY AN ACTIVE RAILWAY, PART OF THE MBTA SYSTEM. THE SITE CURRENTLY HAS A NUMBER OF SMALLER TREES THAT GUARD THIS NORTHERN EDGE AGAINST SOME OF THE TRAFFIC SOUNDS, BUT FOR THE MOST PART THE SOUND WAVES ENTER THE SITE UNINHIBITED.

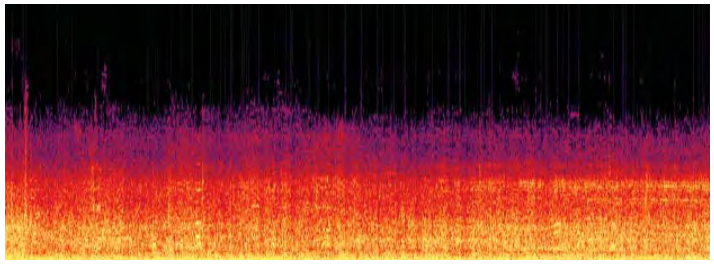
THE HIGHWAY IS LARGELY A WHITE NOISE GENERATOR. IT IS A NEAR CONSTANT SOURCE OF BACKGROUND STATIC AND SEEMS LIKE A PERMANENT ENTITY SURROUNDING AND PERMEATING THE SITE. THE NOISE EVEN MANAGES TO MAKE ITS WAY TO THE SOUTHERN EDGE OF THE SITE WHICH BORDERS BOYLSTON STREET.

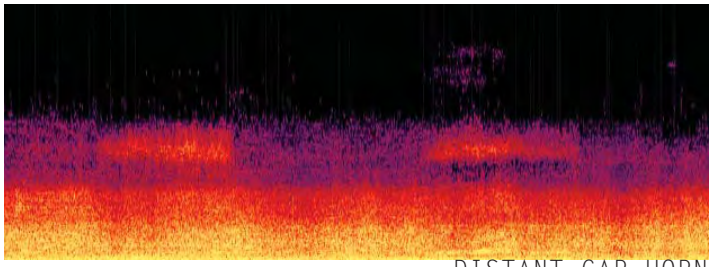
THE IMAGES TO THE RIGHT ARE SPECTRAL FREQUENCY ANALYSES THAT WERE GENERATED FROM MP3 RECORDINGS AT THE SITE. THE RECORDINGS WERE THEN ANALYZED. TYPICAL EVENTS OR CONDITIONS WITHIN THE 85+ MINUTES OF MATERIAL WERE THEN CROPPED AND SELECTED AS THE IMAGERY YOU SEE TO YOUR RIGHT. IMAGES WITH UNIQUE CHARACTERISTICS ARE LABELED AS SUCH.

THE IMAGES SUGGEST A FAIRLY MONOTONE UNEVENTFUL AND PERSISTENT SOUND PROFILE THAT RARELY BREAKS OR AUGMENTS.

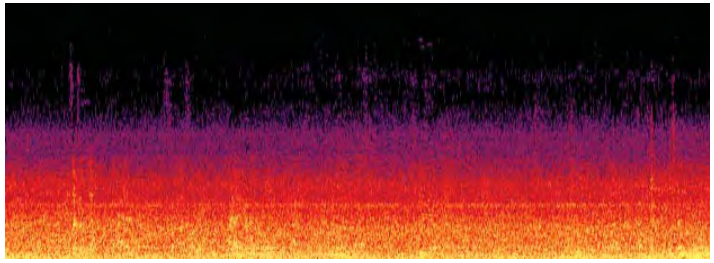


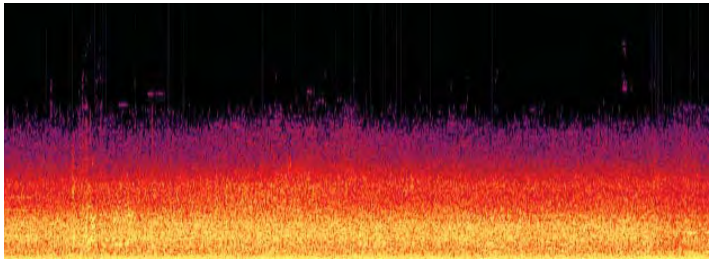


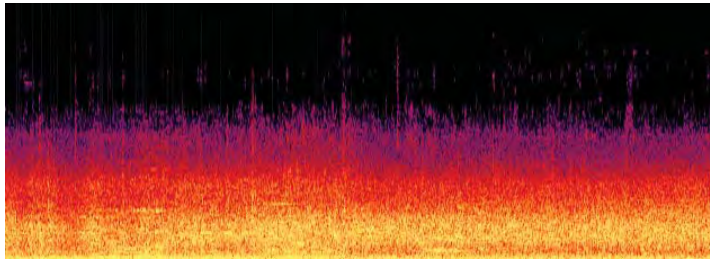


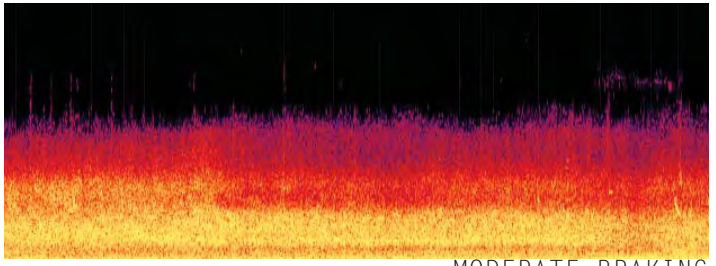


DISTANT CAR HORN

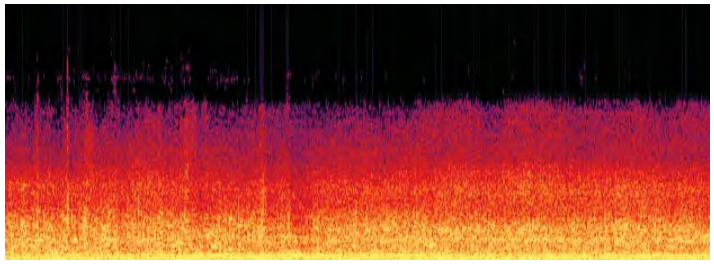


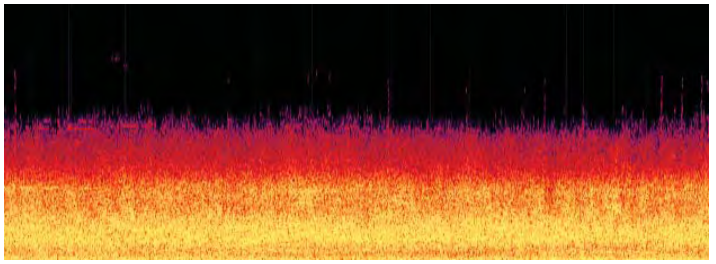






MODERATE BRAKING





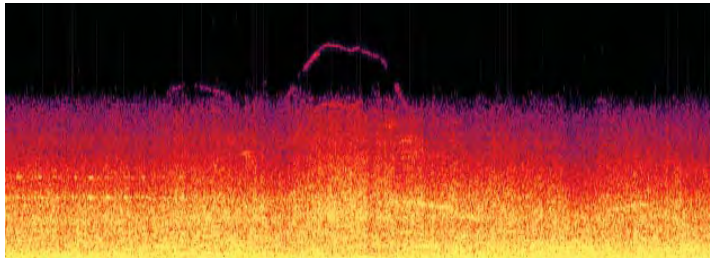
SOUND: BOYLSTON

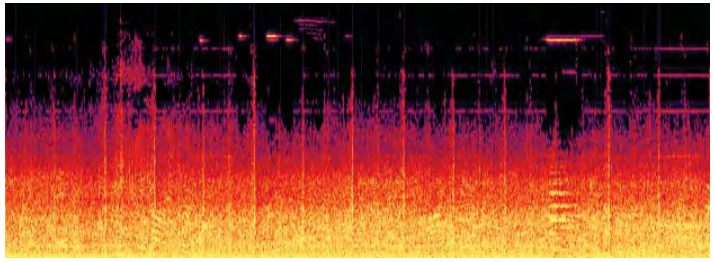
WHILE I-90 IS FILLED WITH SOUND IT IS A CONSISTENT DRONING, WHICH MAKES ONE SAMPLE OF SOUND ALMOST IDENTICAL TO ANOTHER. BOYLSTON STREET, ON THE OTHER HAND, IS FULL OF SONIC EVENTS. THE RECORDINGS DEPICT A NUMBER OF DISTINCT ENTITIES THAT CHALLENGE BOREDOM AND DEMAND ATTENTION LIKE SOME FORM OF IMPROVISATIONAL ART.

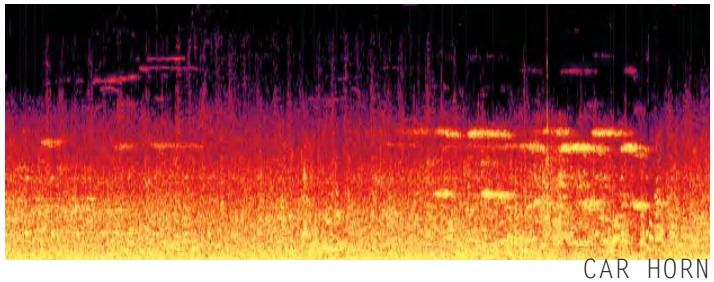
THE BOYLSTON STREET SOUND PROFILE IS LARGELY DOMINATED BY THE PRESENCE OF DISTINCT RHYTHMS GENERATED FROM PEOPLES FOOTSTEPS AND CONVERSATIONS. SOME OF THE IMAGES TO THE RIGHT ARE FILLED WITH SHARP VERTICAL LINES. SOME, SHARPER THAN OTHERS, CAN EVEN DISTINGUISH BETWEEN VARIOUS FORMS OF FOOTWEAR.

THE IMAGES ARE ALSO LOADED WITH VEHICULAR GENERATED ARTIFACTS LIKE HEAVY BRAKING, ACCELERATION AND THE OCCASIONAL SIREN. THE BOYLSTON STREET SOUND FILES ARE FAR MORE ENGAGING AND INVASIVE. THE IMAGERY ILLUSTRATES THE DIVERSIFIED AURAL CONDITION OF CROWDS AND CARS MOVING TOWARDS UNSPECIFIED DESTINATIONS. ONE CAN HEAR THAT THIS IS A COMPLETELY DIFFERENT TYPE OF MOVEMENT THAN THAT OF I-90.

THE IMAGES TO THE RIGHT ARE SPECTRAL FREQUENCY ANALYSES THAT WERE GENERATED FROM MP3 RECORDINGS AT THE SITE. THE RECORDINGS WERE THEN ANALYZED. TYPICAL EVENTS OR CONDITIONS WITHIN THE 85+ MINUTES OF MATERIAL WERE THEN CROPPED AND SELECTED AS THE IMAGERY YOU SEE TO YOUR RIGHT. IMAGES WITH UNIQUE ELEMENTS ARE LABELED AS SUCH.







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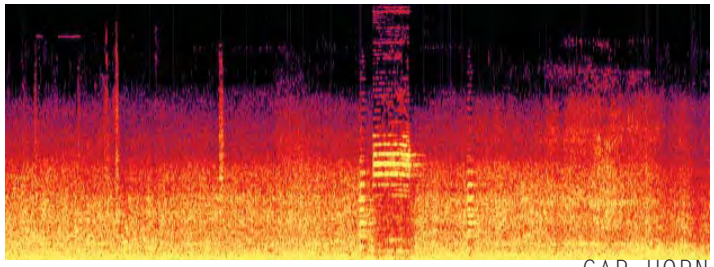

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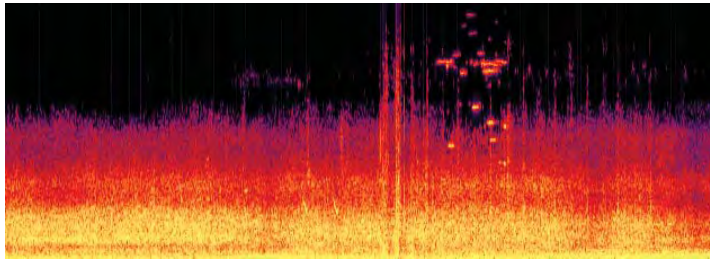
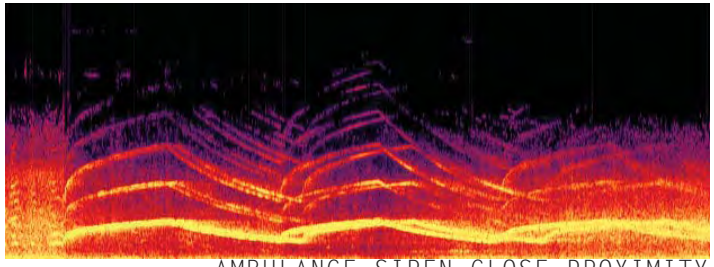
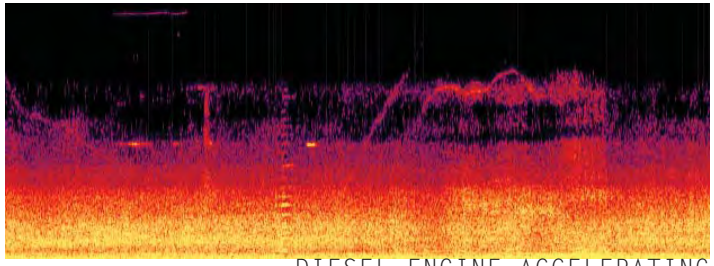
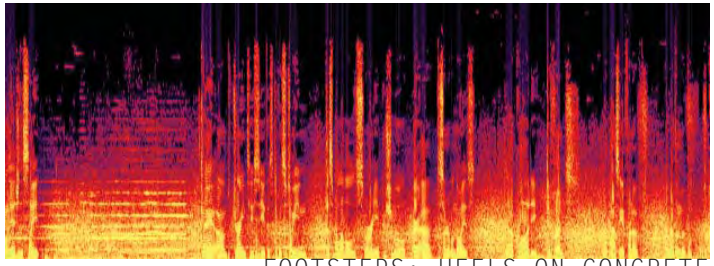




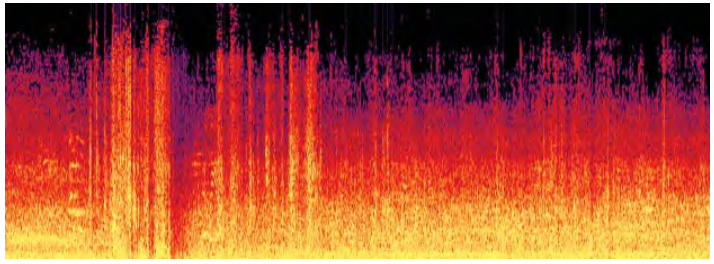
AMBULANCE SIREN CLOSE PROXIMITY

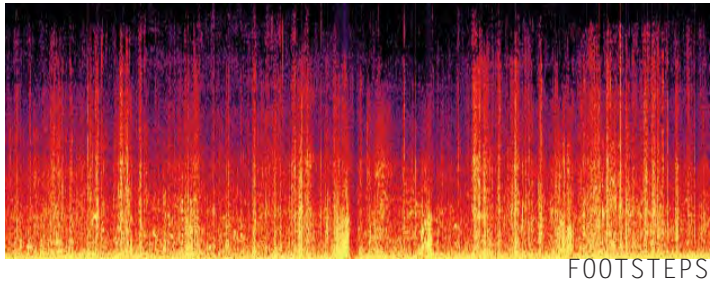


DIESEL ENGINE ACCELERATING



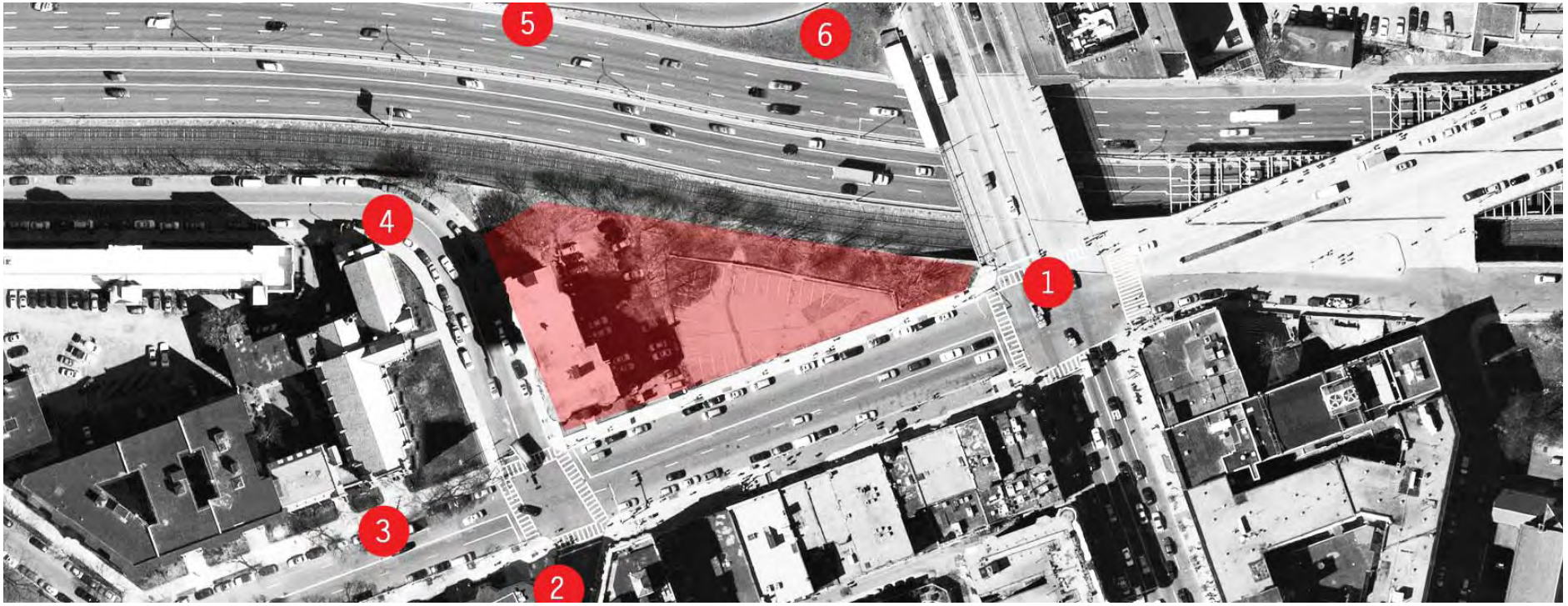
FOOTSTEPS: HEELS ON CONCRETE





FOOTSTEPS

SITE PHOTOGRAPHS



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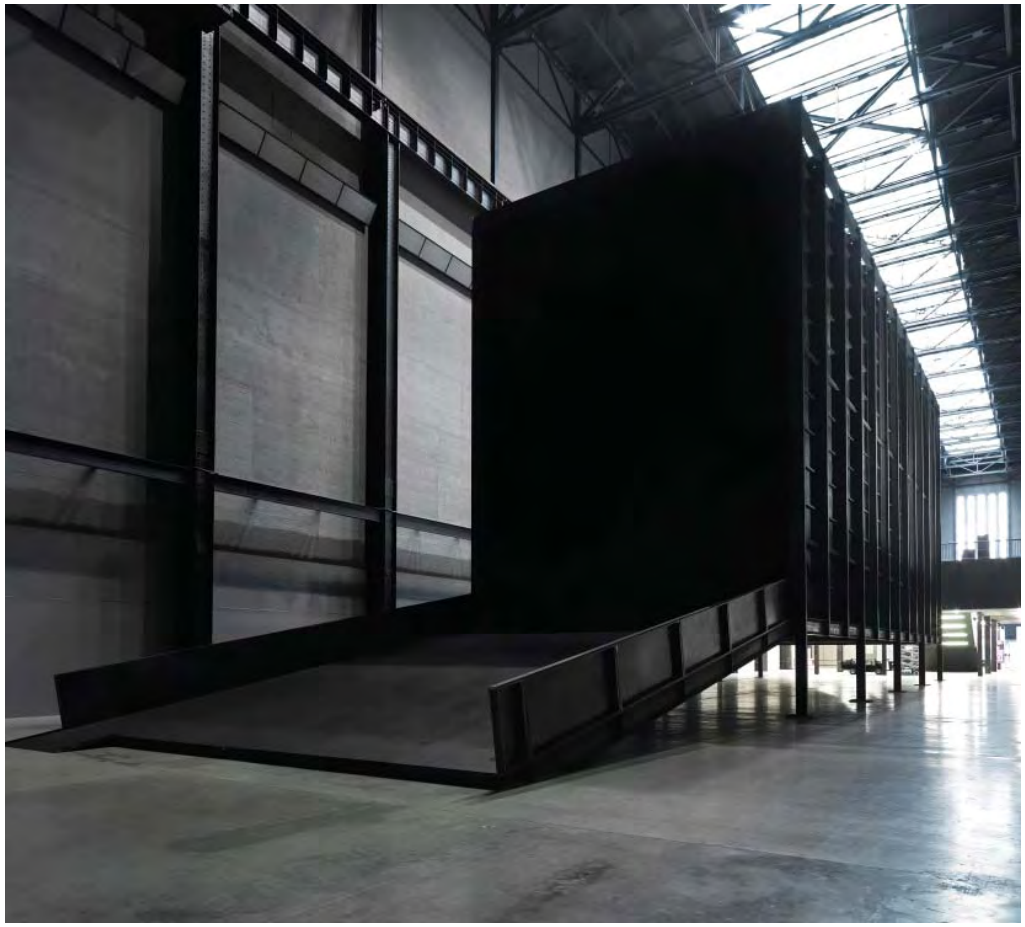
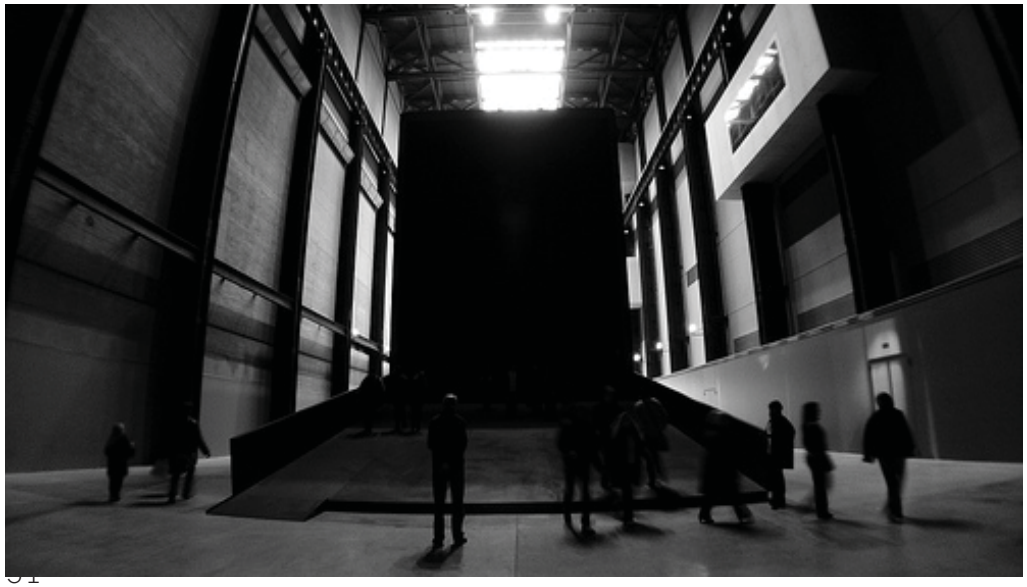
PRECEDENT



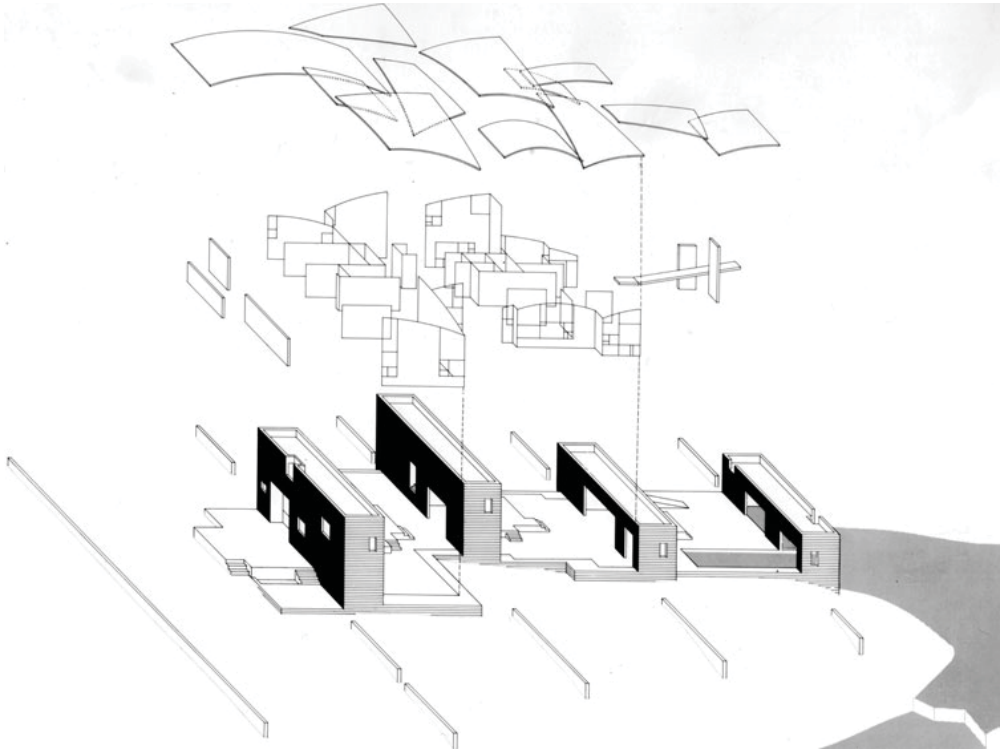


THE WAY IT IS

THE WAY IT IS BY MIROSLAV BALKA IS ONE OF THE MORE SIMPLE PROJECTS IN THIS LIST, BUT ALSO ONE OF THE MOST POWERFUL/COMPLEX. IT IS A BOX, OPEN AT ONE END AND LINED WITH MATERIAL WHICH ABSORBS BOTH LIGHT AND SOUND. THIS PARTICULAR MATERIAL SYNTHESIZES THE RELATIONSHIP BETWEEN BOTH THE AUDITORY AND OCULAR DATA STREAMS. THIS RELATIONSHIP IS ONE OF SILENCE AND DARKNESS, OR THE ABSENCE OF EITHER LIGHT OR SOUND. WITHOUT VISUAL OR AUDITORY REFERENCE, THE CLEARLY DEFINED EXTERIOR SHELL OF THE BOX GETS EXPANDED TO A NEAR INFINITY ON THE INTERIOR. ONE CANNOT SENSE A TERMINUS POINT, THERE IS NO END TO THIS SPACE. THIS RELATIONSHIP BETWEEN LIGHT AND SOUND THROUGH THE CAREFUL USE OF MATERIAL UNVEILS THE POTENTIAL OF A PURE SPACE DESIGNED THROUGH BOTH VISUAL AND AUDITORY PHENOMENA.

ZADAR SINGING STAIRS

THE ZADAR SINGING STAIRS ARE INTERESTING BECAUSE OF THE RELATIONSHIP BETWEEN THE PRODUCTION OF SOUND AND THE ENVIRONMENT. THE SINGING STAIRS CREATE SOUND BY MANIPULATING THE RHYTHMIC AND KINETIC MOTION OF THE OCEAN TIDE. THE STAIRS ARE DESIGNED IN A WAY SIMILAR TO THAT OF AN ORGAN. AS THE TIDE RUSHES IN AIR IS TRAPPED IN PATHWAYS RUNNING THROUGH THE STAIR MASS RESULTING IN TONES BEING “PLAYED” BY THE SEA. THIS PROJECT REACTS TO THE ENVIRONMENT IN A UNIQUE WAY, PRODUCING COMPOSITIONS AT THE WILL OF AIR AND WATER CURRENTS. IN A WAY THESE COMPOSITIONS ARE BASED ON THE UNSEEN FLOWS WITHIN NATURE, THOSE OF THE CURRENT AND OF THE WIND.

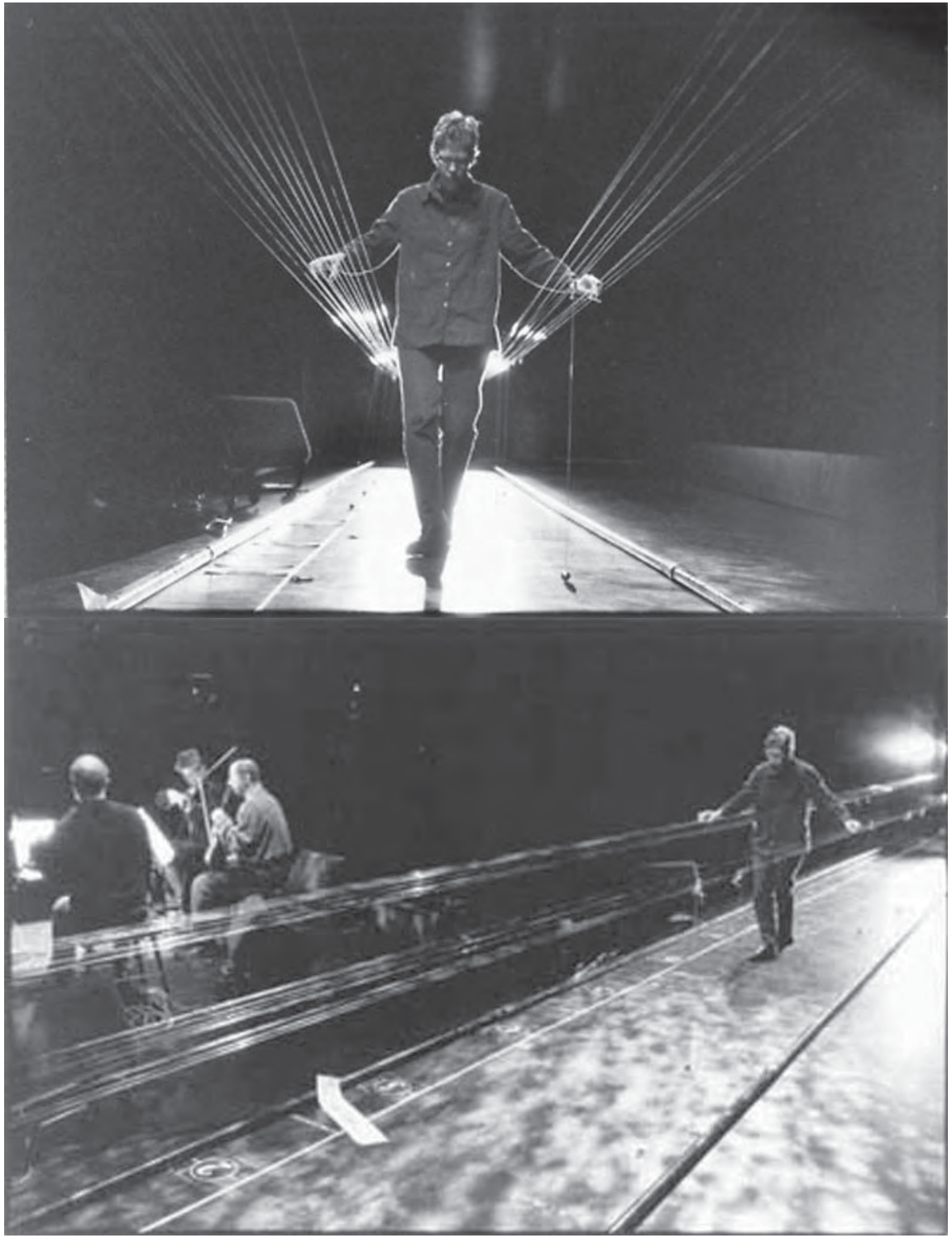


STRETTO HOUSE

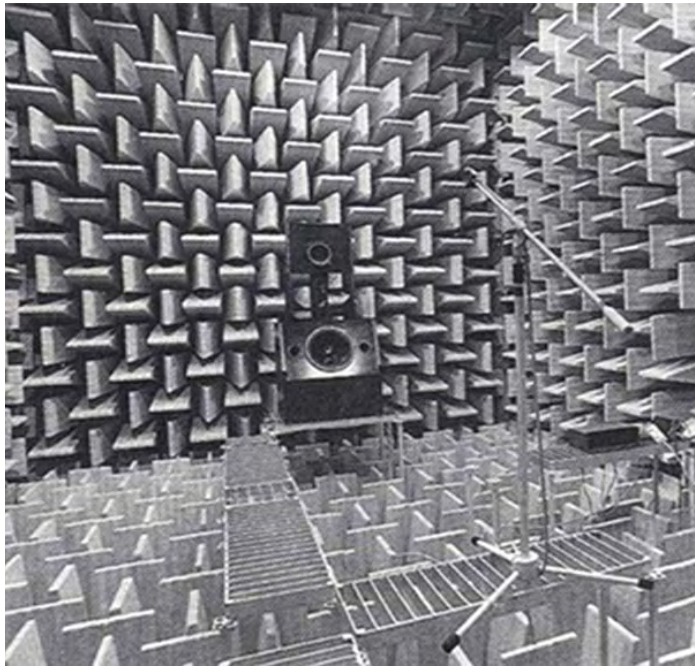
THE STRETTO HOUSE BY STEVEN HOLL IS AN EXAMPLE OF ARCHITECTURE AS A TRANSLATION OF MUSIC. HOLL REFERENCED THE WORKS OF BELA BARTOK AS THE GENERATOR OF SPACE AND COMPOSITION FOR THE RESIDENCE, BARTOK'S WORKS INCLUDED MANY RELATIONSHIPS BETWEEN ELEMENTS BASED UPON MATHEMATICAL PROPORTIONS DERIVED FROM THE FIBONACCI SERIES. THESE ELEMENTS OFTEN SEEMED AT ODDS WITH THE REST OF THE MUSIC AND WERE OFTEN DESCRIBED AS MISMATCHES. HOLL TRANSLATES THIS MISMATCH AS A DIALOGUE BETWEEN MASSIVE RECTANGULAR ELEMENTS AND CURVING STEEL ROOFS, CREATING A CLASH OF FORMAL TYPOLOGIES WHICH GENERATES DYNAMIC SPACE. THE NAME OF THE HOUSE ITSELF IS BORROWED FROM THE MUSICAL TERM TO DENOTE OVERLAPPING FUGUES WITHIN A COMPOSITION. PERHAPS THESE MUSICAL STRETTOS CAN BE COMPARED TO THE OVERLAPPING ROOF PLANES WITCH DEFINE THE INTERIOR SPACE OF THE RESIDENCE.

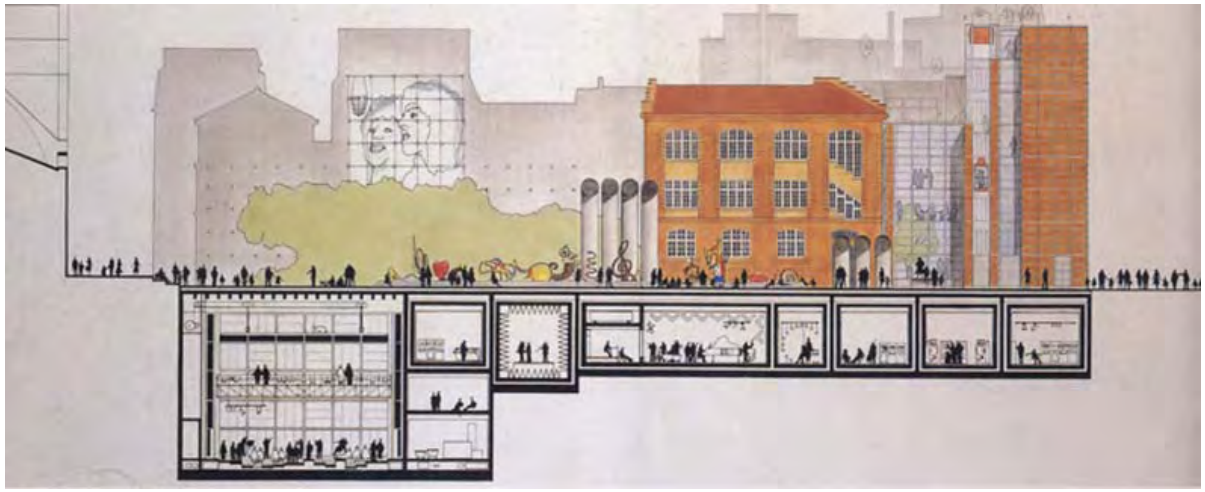
STRINGED INSTRUMENT

THE STRINGED INSTRUMENT BY ELLEN FULLMAN IS AN INSTALLATION PIECE OF MULTIPLE STRINGS REACHING 85 FEET IN LENGTH. THE STRINGS FORM BOTH AN AUDITORY AND VISUAL BOUNDARY. THIS PROJECT IS UNIQUE IN THE SENSE THAT THESE BOUNDARIES CAN BE MANIPULATED BY VISITORS. VISITORS PLAY A CRUCIAL ROLE IN CONSTANTLY REDEFINING THE AUDIOSCAPE. THIS PROJECT SUGGESTS THAT SPACE CAN BE USER-DEFINED AND THAT THE ART OF SOUND-MAKING CAN SIMULTANEOUSLY CRAFT THE CHARACTERISTIC OF A PLACE.



IRCAM EXTENSION

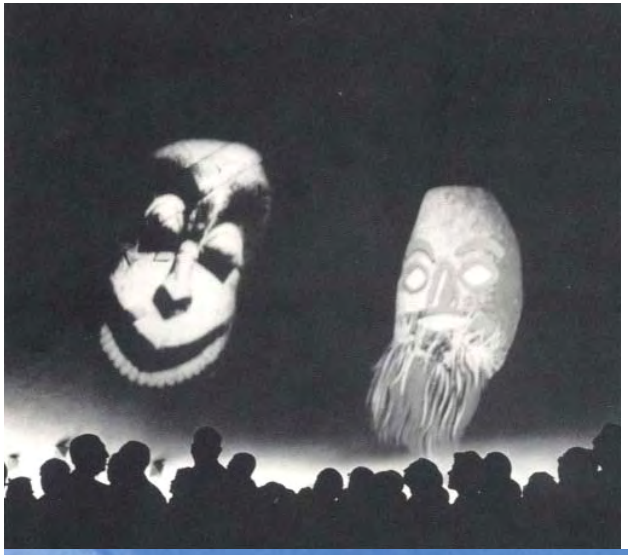


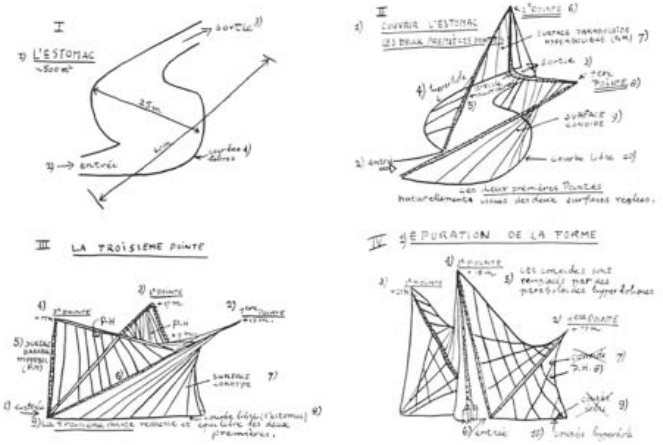


THE IRCAM INSTITUTE EXTENSION BY RENZO PIANO IS AN EXAMPLE OF SPACES ORGANIZED AROUND THE ANALYSIS OF SOUND IN CONTROLLED SPACES. THE ORGANIZATION AND FORMALIZATION OF SPACE IS FUNCTIONAL AND ORDERED IN DEFERENCE TO THE FREE FORM AND ARTISTIC FORMAL MODELS OF THE PREVIOUS PRECEDENTS. THE AUDITORY BARRIERS IN THIS PROJECT ARE DESIGNED TO ISOLATE AND ANALYZE THE ACOUSTIC PROPERTIES OF VARIOUS MATERIALS AND PERFORMANCES. ANECHOIC CHAMBERS ARE CONSTRUCTED AS FLOATING BOXES TO INHIBIT THE TRANSFER OF UNWANTED SOUND. THIS PROJECT IS HIGHLY TECHNICAL AND DETAILED WITH SPACES FOR ACOUSTIC INSULATION.

PHILIPS PAVILION

THE PHILIPS PAVILION WAS BUILT FOR THE 1957 WORLDS FAIR IN BRUSSELS, BELGIUM. IANNIS XENAKIS, AND A CONTEMPORARY COMPOSER NAMED EDGAR VARESE DESIGN AN EVENT FILLED WITH LIGHT AND SOUND WHICH EVENTUALLY BECAME KNOWN AS THE POEM ELECTRONIQUE. XENAKIS WORKED TO ACHIEVE THE HYPERBOLIC SURFACES THAT COMPRISED THE PAVILION'S EXTERIOR. HIS EVENTUAL SOLUTION RELIED ON TENSION CABLES THAT SUPPORTED PRECAST CONCRETE PANELS IN A THREE DIMENSIONAL RULED SURFACE. THE POEM ELCTRONIQUE WAS DESIGNED AS AN EIGHT MINUTE SEQUENCE OF VIDEO AND SOUND WITHIN THE PAVILION. 500 PEOPLE WOULD ENTER AT A TIME INTO COMPLETE DARKNESS THROUGH A BOTTLENECK OPENING AND THEN LEAVE THROUGH A SIMILAR SEQUENCE.





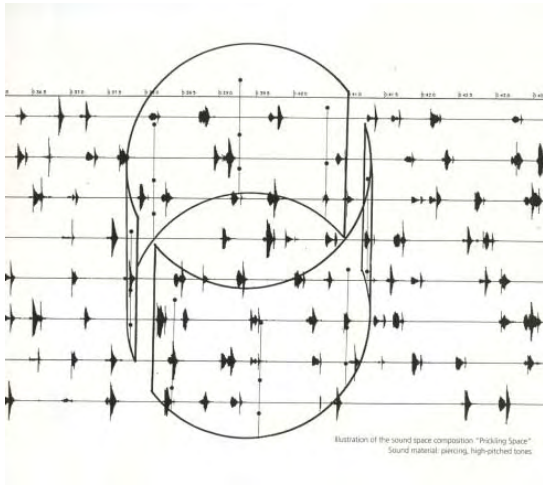
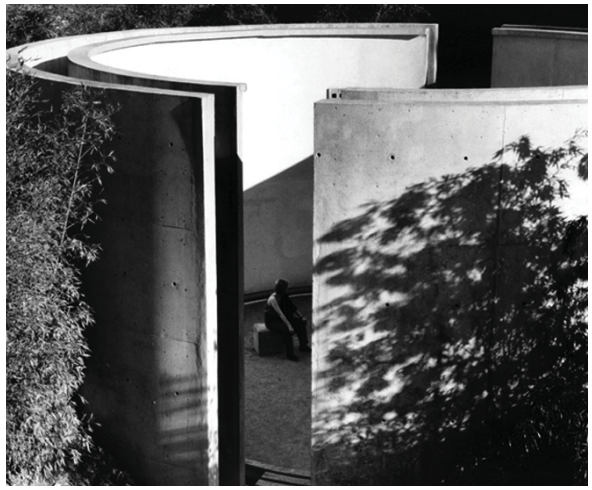
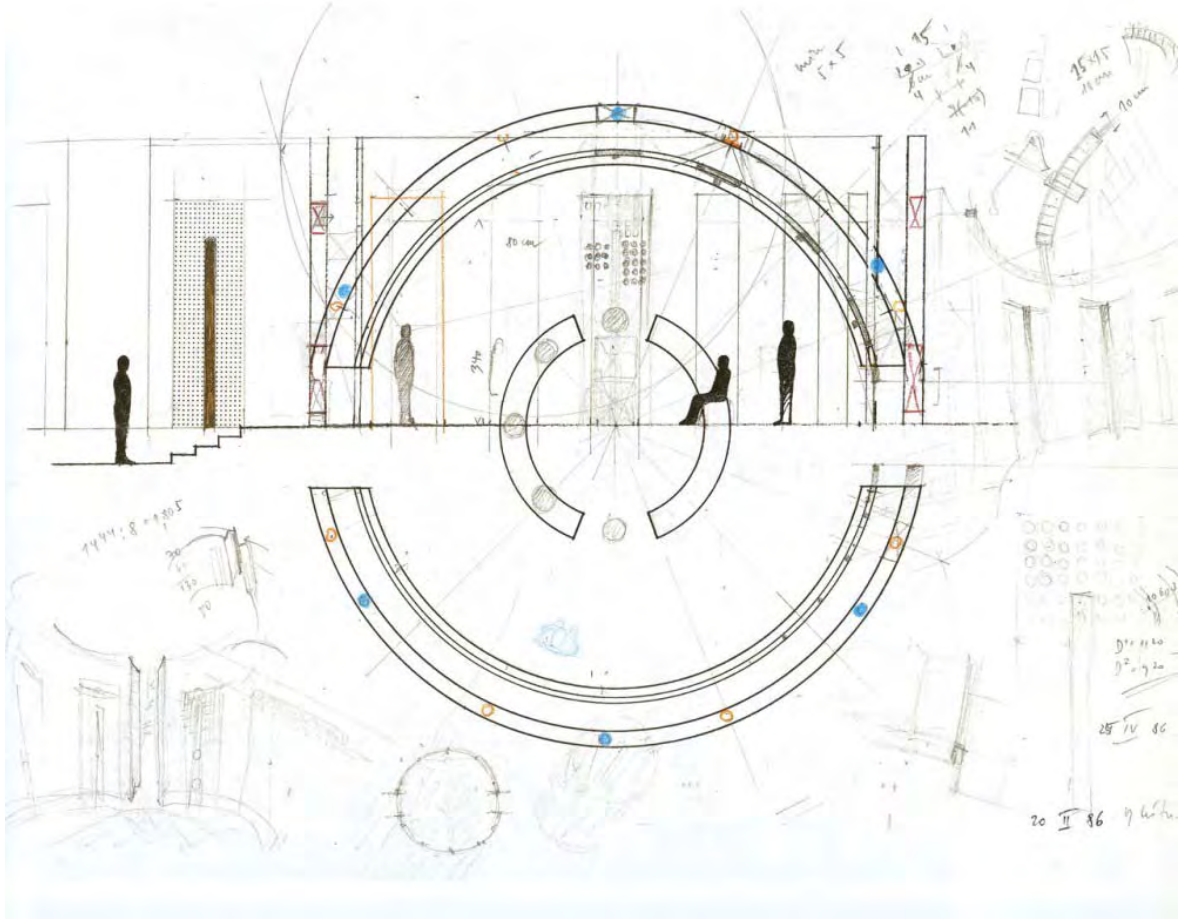


Illustration of the sound space composition "Prickling Space"
Sound material: piercing, high-pitched tones



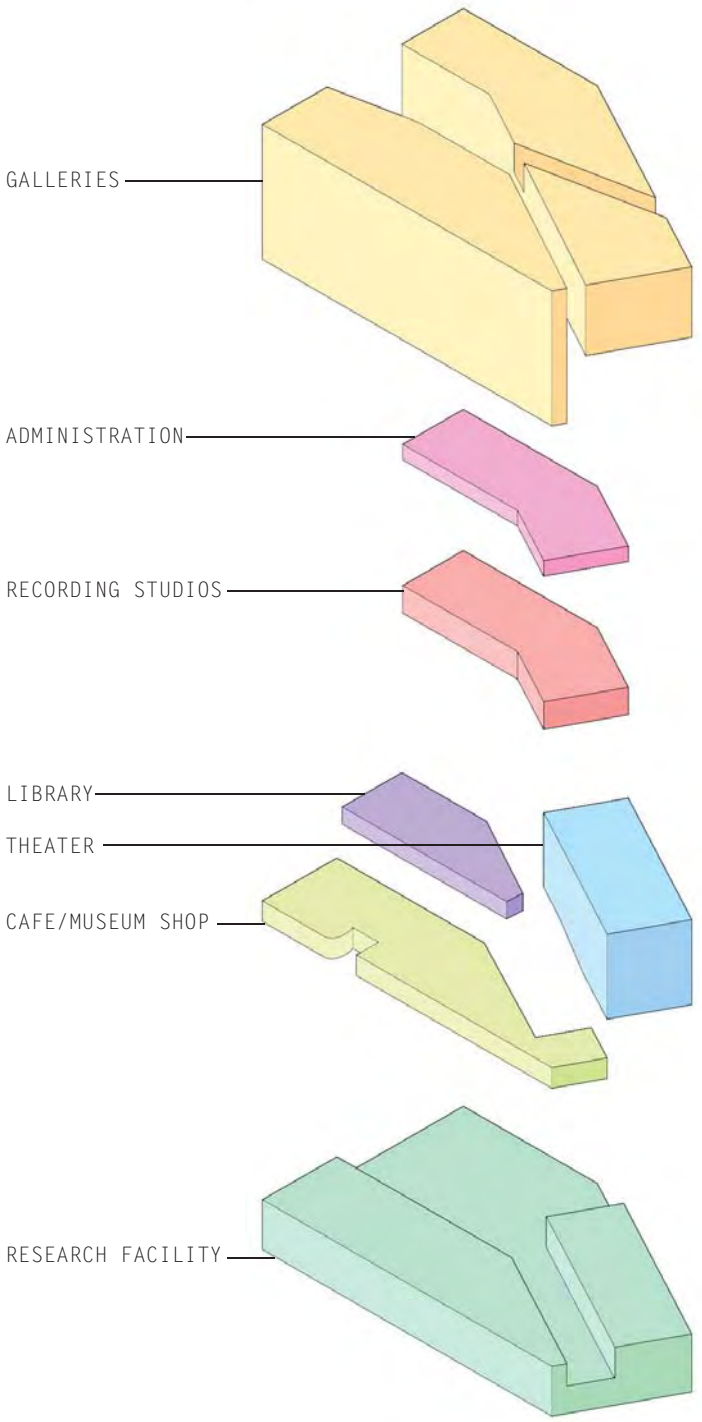


BERHARD LEITNER

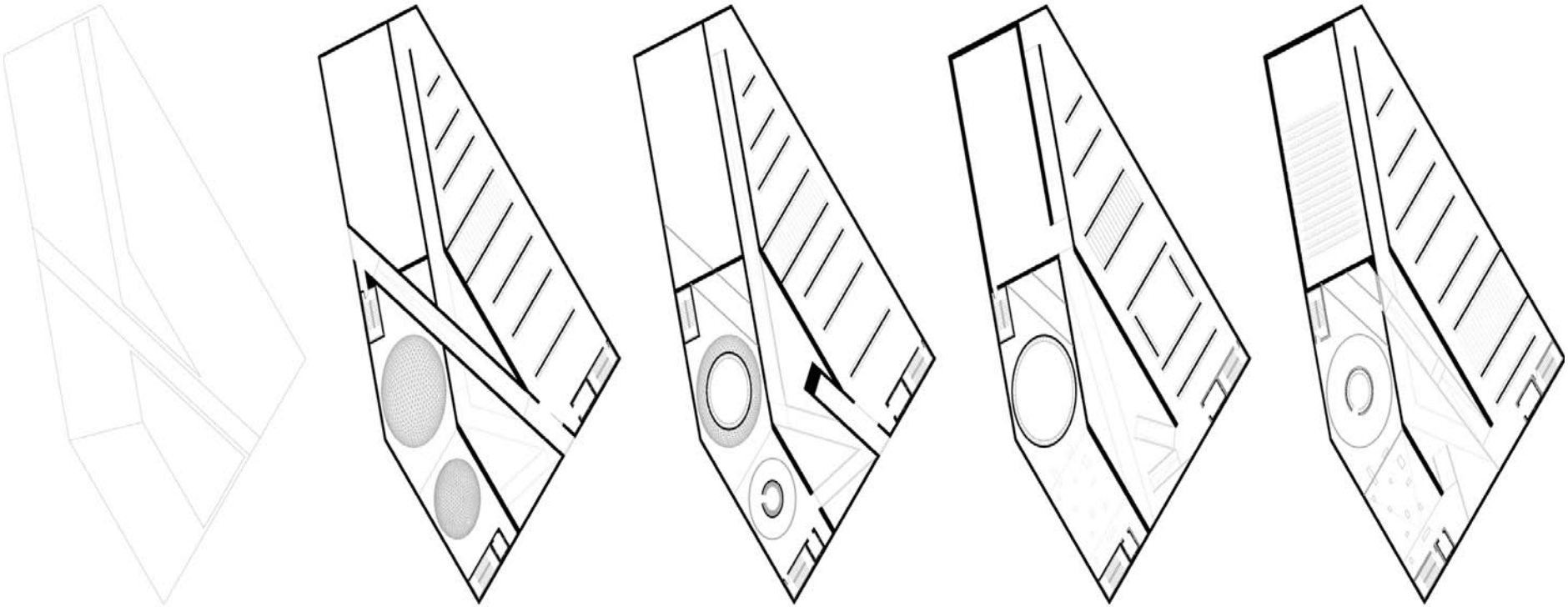
BERHARD LEITNER'S WORK IS FOCUSED ON THE CREATION OF SOUND INSTALLATIONS THAT STUDY THE RELATIONSHIP BETWEEN SOUND, SPACE AND BODY. THE PERMANENT INSTALLATION SEEN TO THE RIGHT IS HOUSED IN THE PARC-DE-LA-VILLETTE IN PARIS,FRANCE IS AN EXAMPLE OF LEITNER'S COMPOSITIONAL EXPLORATION. THE INSTALLATION IS AN OPEN CYLINDER OF CONCRETE LINED WITH HIDDEN SPEAKERS WHICH EMIT SOUND ACCORDING TO A PREDISPOSED SPATIAL/ TEMPORAL SEQUENCE. THE UPPER LEFT IMAGE IS AN EXAMPLE OF LEITNERS TECHNICAL SKETCHES THAT ACT AS MANUSCRIPTS FOR THE SONIC INSTALLATIONS. IN THIS CASE THE CONCRETE CYLINDER ACTS AS A CONTAINER THAT VISITORS MAY ENTER AND EXPERIENCE AS PART OF THE CIRCULATION SYSTEM WITHIN THE PARK'S GARDENS.

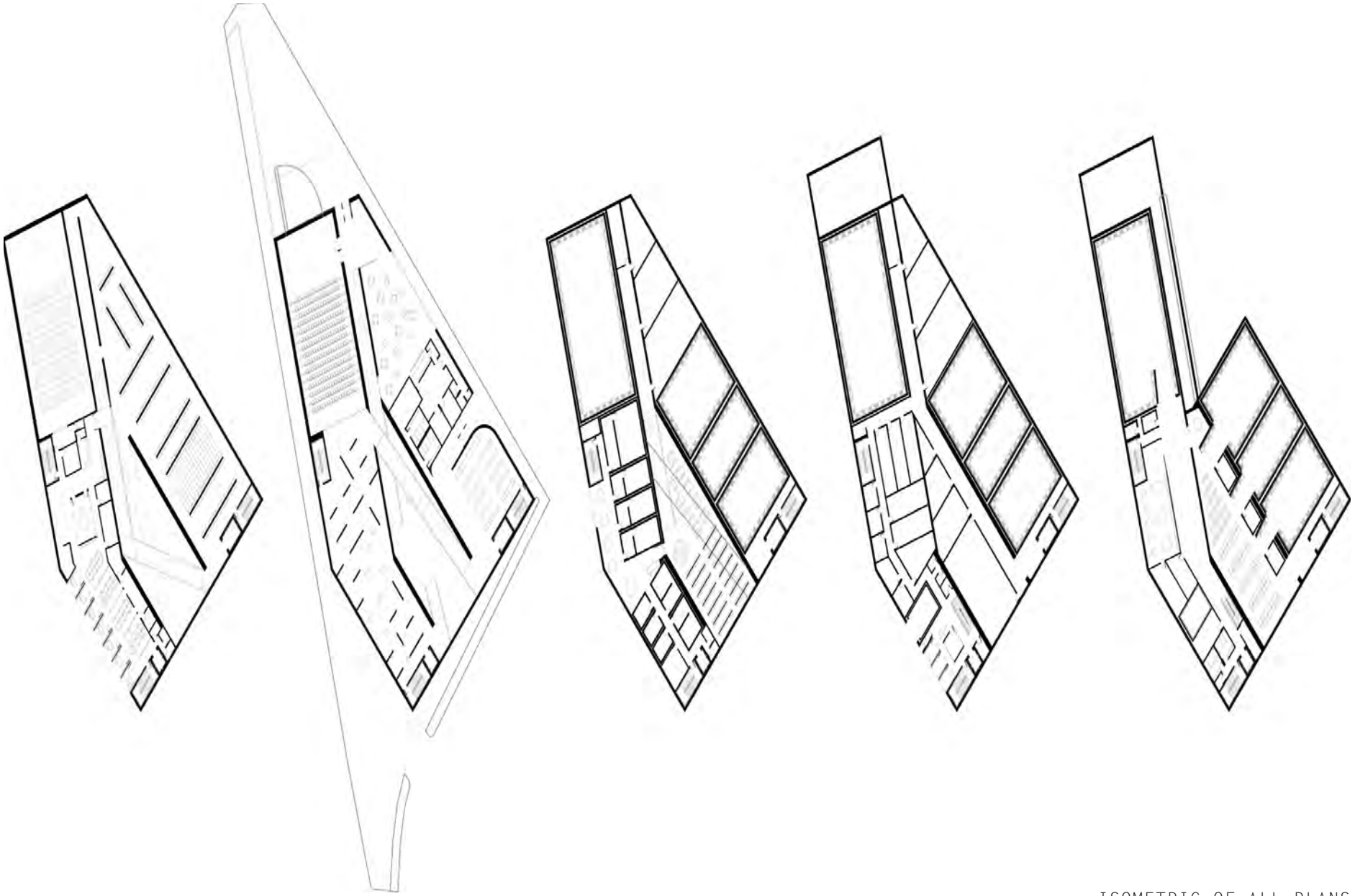
FINAL DESIGN

FIGURE GROUND

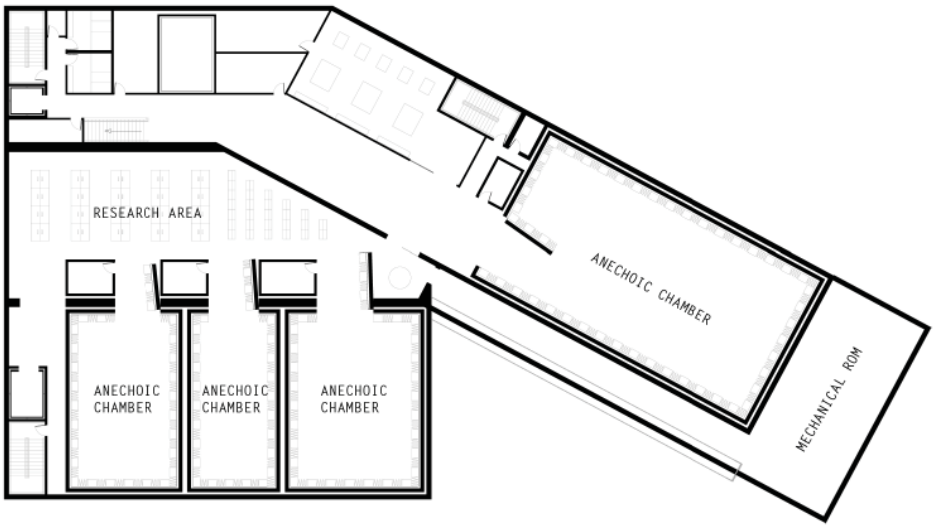


PROGRAM AXON

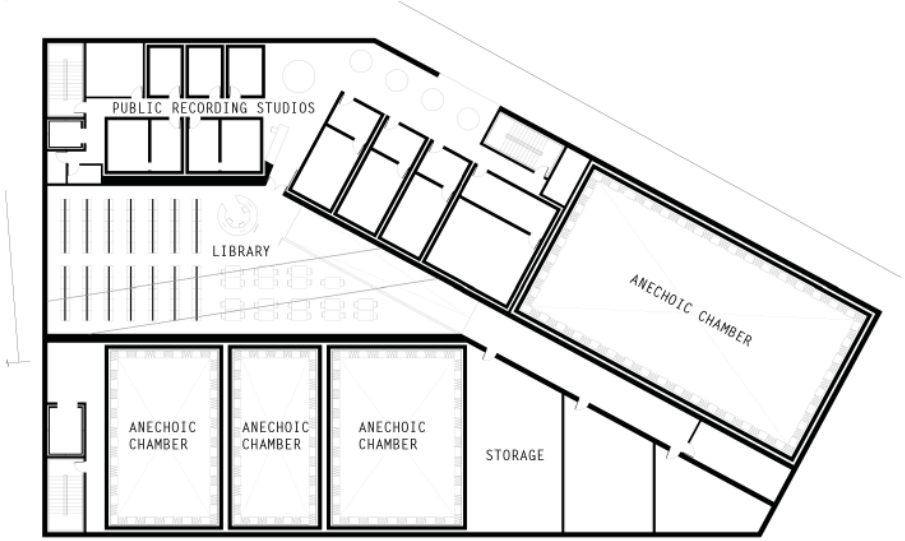




ISOMETRIC OF ALL PLANS

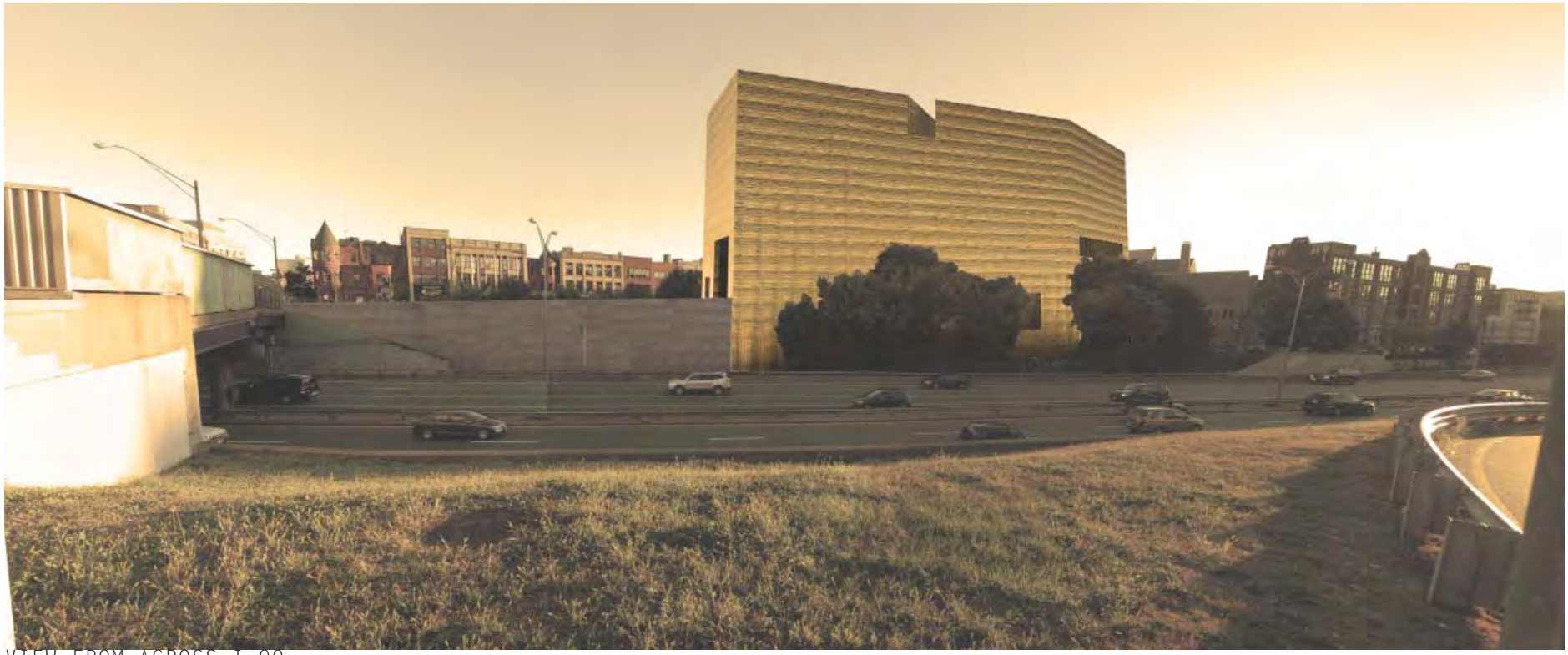


BASEMENT LEVEL -2 RESEARCH CENTER

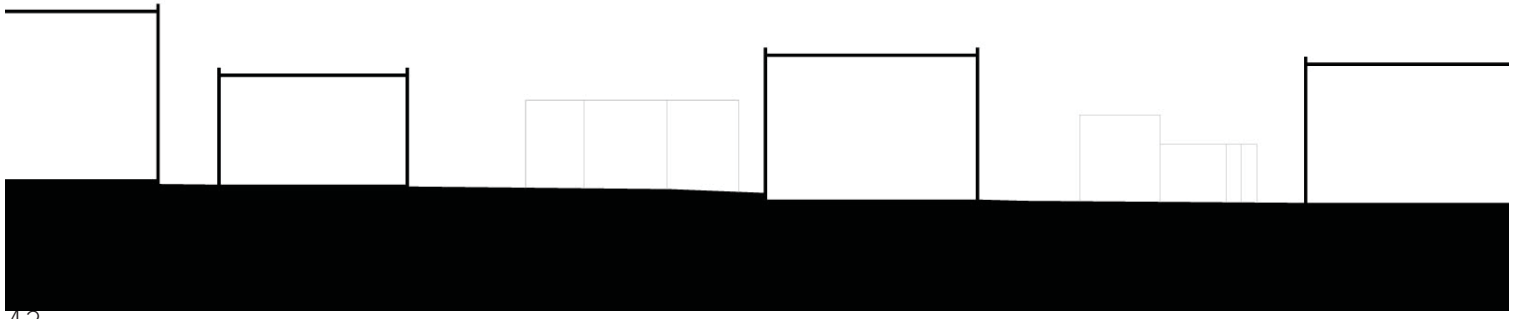


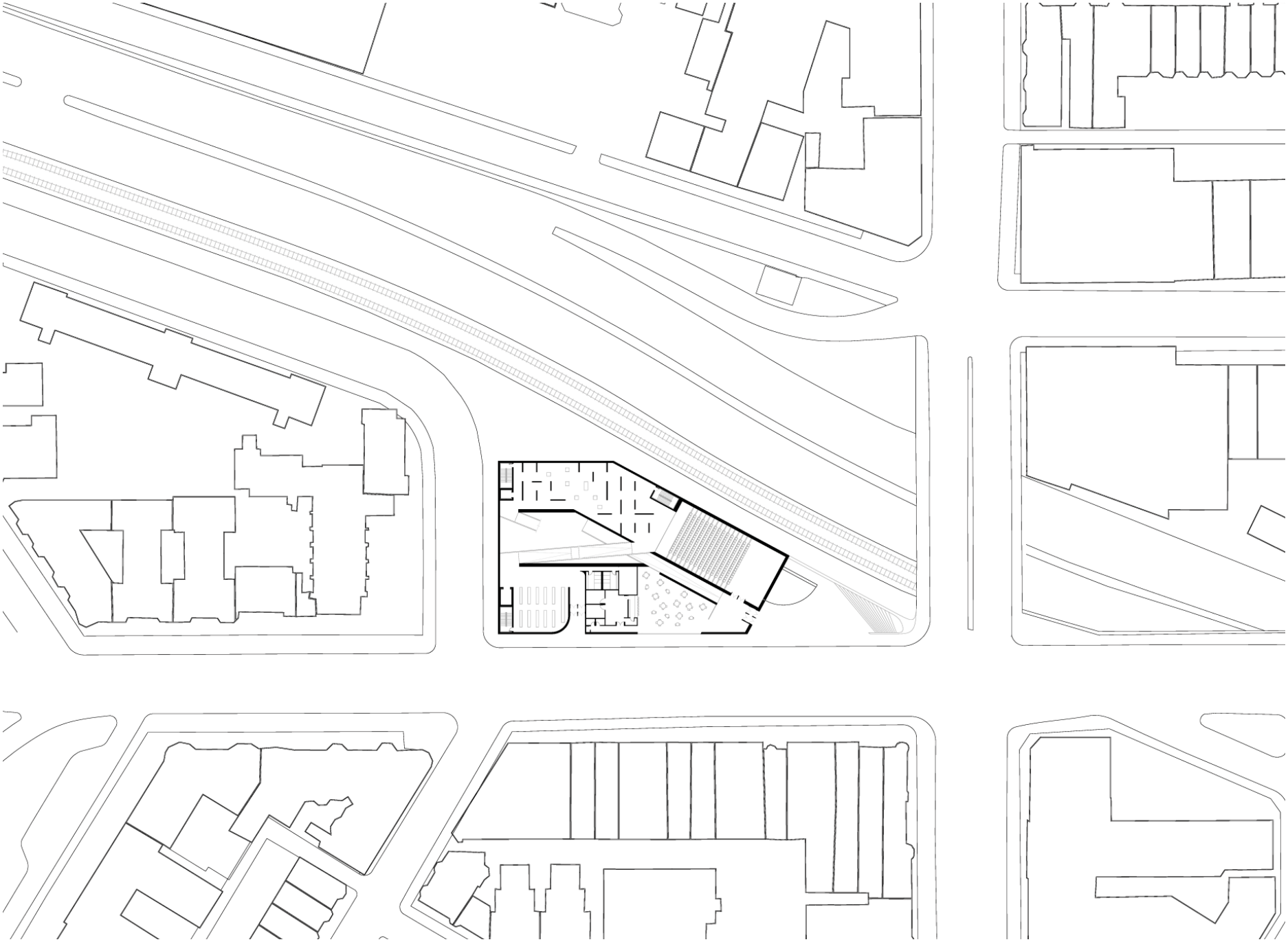
BASEMENT LEVEL-1 RESEARCH CENTER/STORAGE

SITE SECTION



VIEW FROM ACROSS I=90

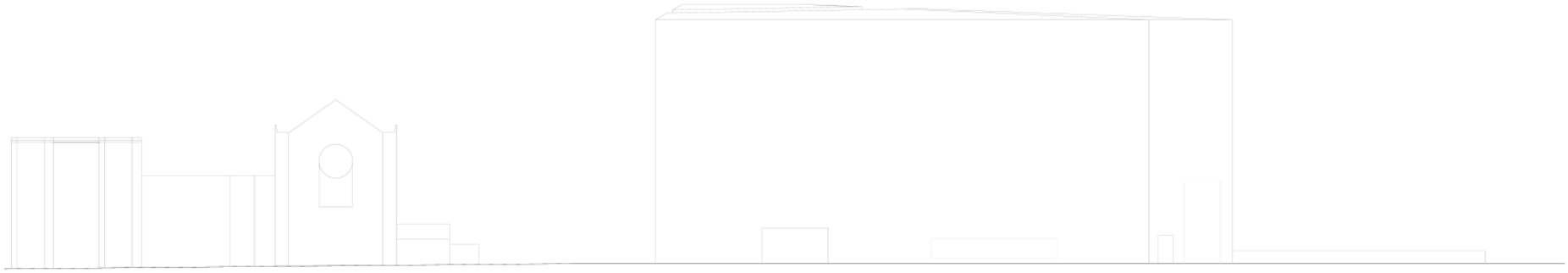




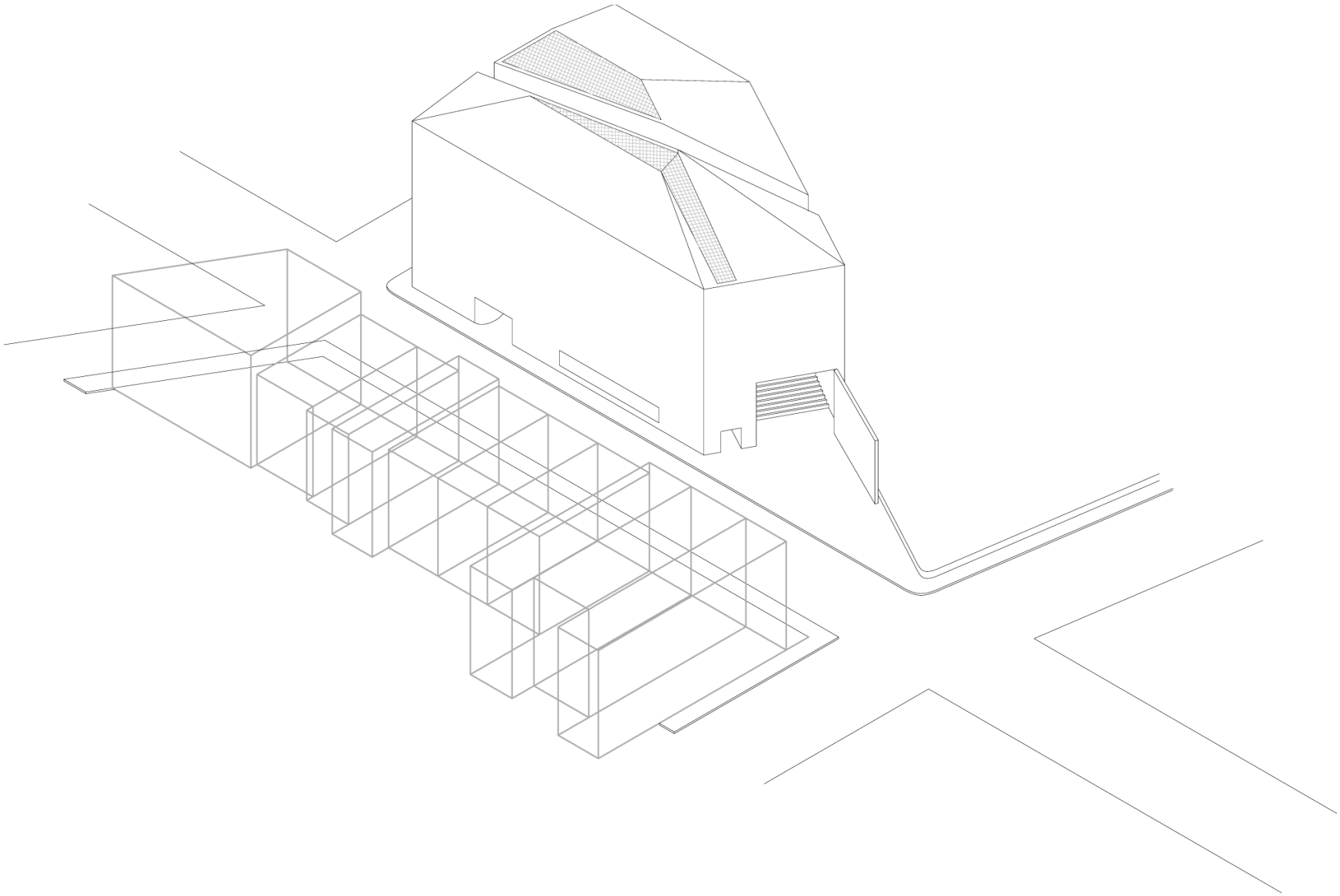
GROUND FLOOR PLAN WITH CONTEXT

VIEW FROM BOYLSTON STREET

ENTRANCE VIEW



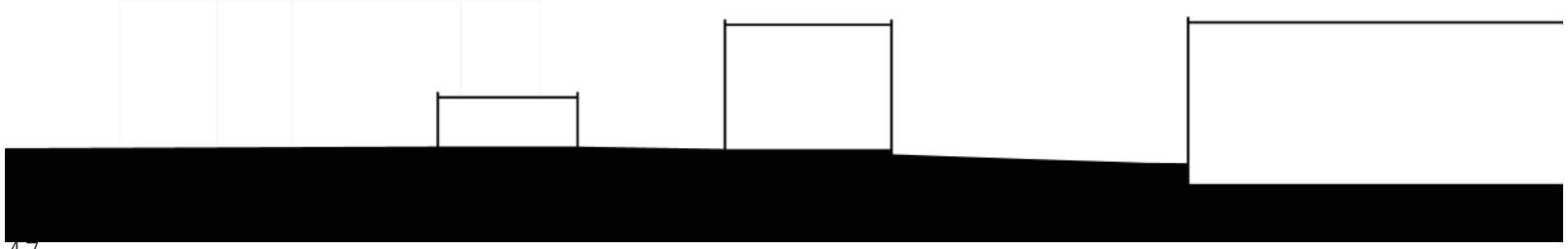
NORTH ELEVATION

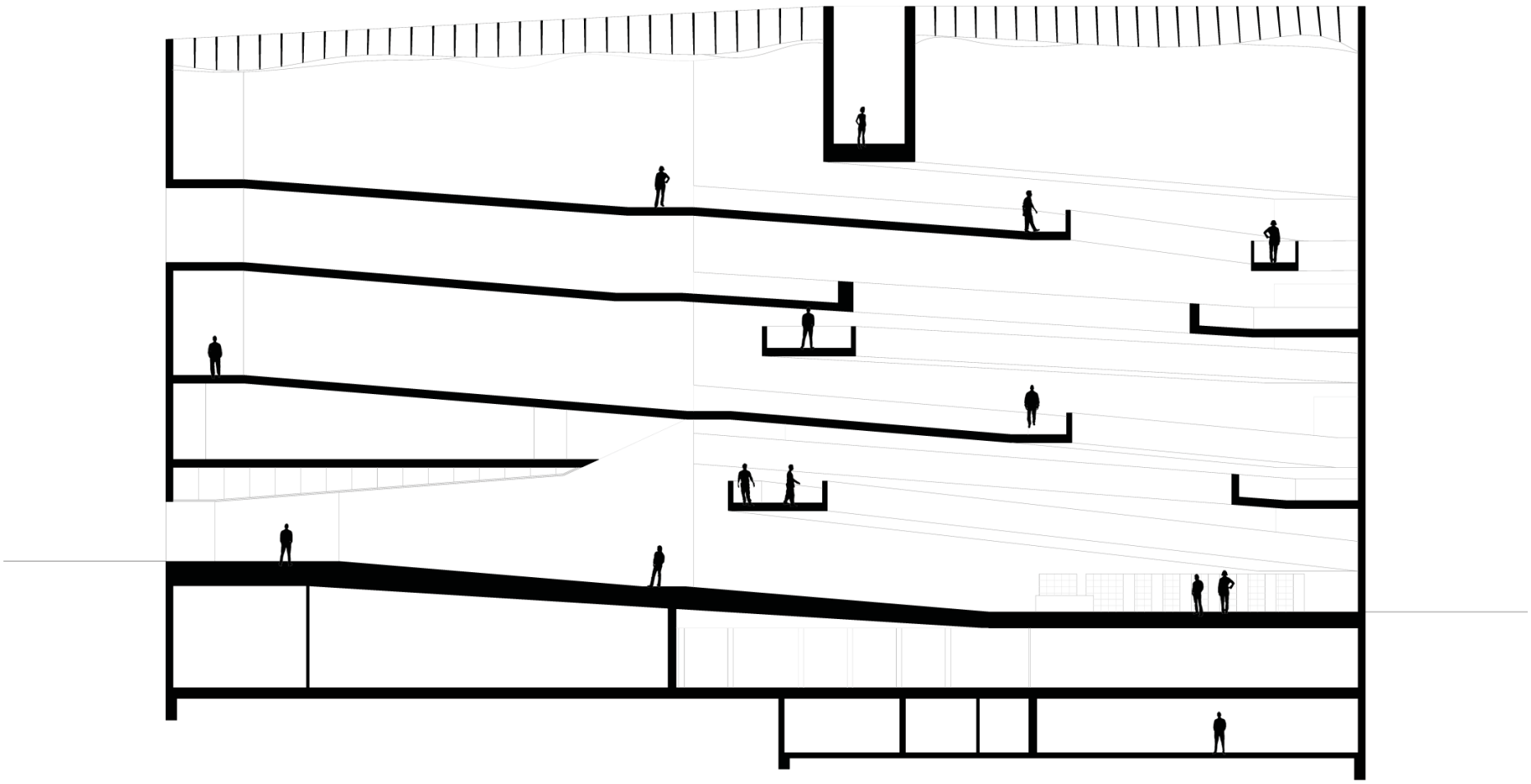


AXON OF SITE AND CONTEXT

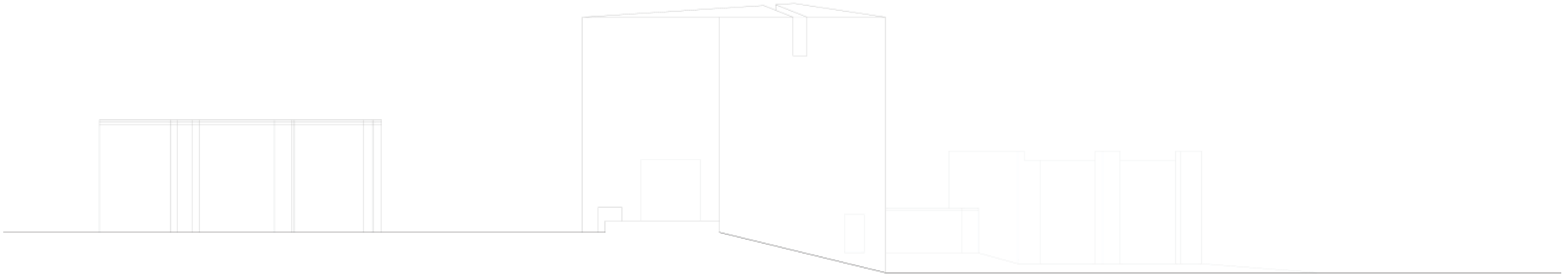
SITE SECTION

NIGHT VIEW OF THEATER





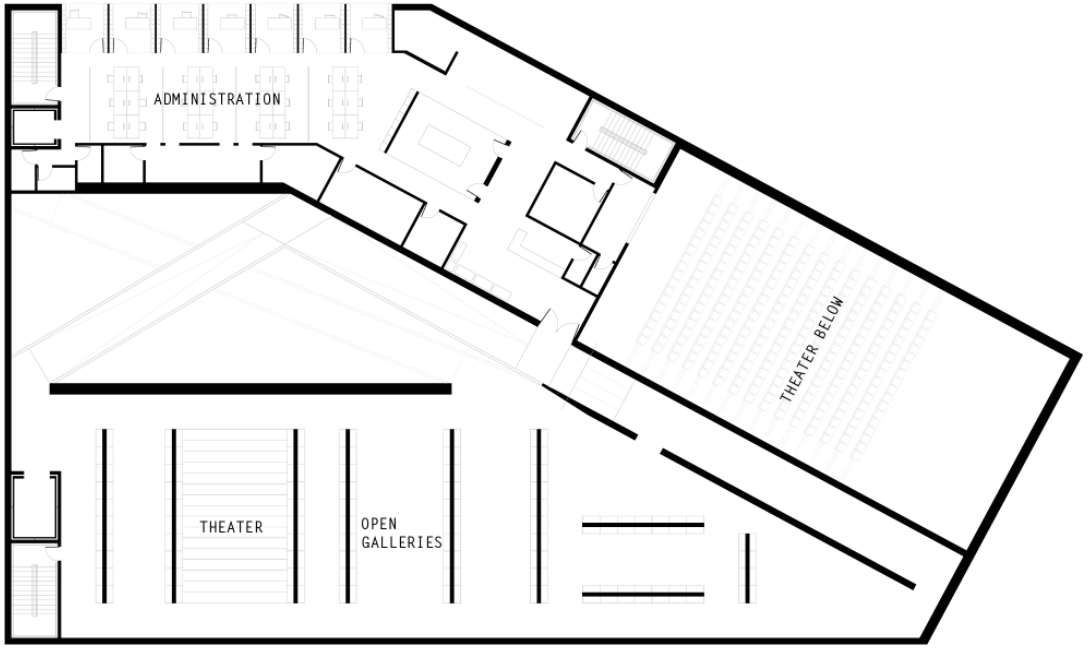
LONGITUDINAL SECTION



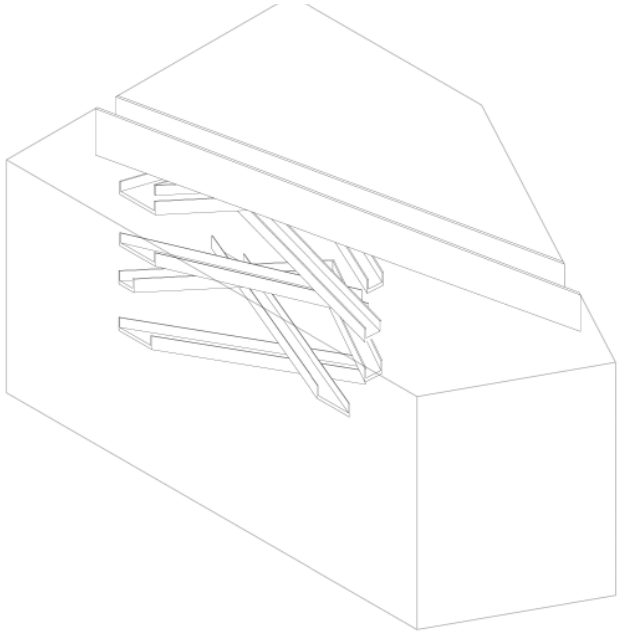
WEST ELEVATION

VIEW FROM LIBRARY

THE ATRIUM IS ONE OF THE MOST SIGNIFICANT SPACES IN THE ENTIRE COMPLEX. THE ATRIUM IS DESIGNED AS A LARGE SCALE ECHO CHAMBER. AN ECHO IS OFTEN DESCRIBED AS AN ACOUSTIC ANOMALY WHICH RESULTS IN THE CONTINUOUS REFLECTION AND REFRACTION OF SOUND BACK TO THE SOUNDS POINT OF ORIGIN. THE DISTANCE BETWEEN TWO SOLID SURFACES REQUIRED TO PRODUCE AN ECHO IS 100 FEET DUE TO THE PHYSICAL PROPERTIES OF SOUND WAVES. THE ATRIUM IS DESIGNED TO PROVIDE A PROGRESSIVE SONIC EXPERIENCE WHERE THE VISITOR RISES THROUGH THE SPACE ON A NUMBER OF DIFFERENT BRIDGES AND GETS TO EXPERIENCE THE REFLECTION OF SOUND AT DIFFERENT POINTS ON ITS JOURNEY BETWEEN THE FLOOR AND THE CEILING. IF A SERIES OF SOUNDS WERE PRODUCED AT THE BASE OF THE ATRIUM ONE COULD EXPERIENCE THEM AT DIFFERENT PHYSICAL INTERVALS DUE TO THE LOCATION AND FREQUENCY OF THE BRIDGES. ONE COULD THEN START TO UNDERSTAND THE TRANSFORMATION OF SOUND OVER A CERTAIN DISTANCE AND THEN START TO MAKE RELATIONSHIPS BETWEEN SOUND AND SPACE.

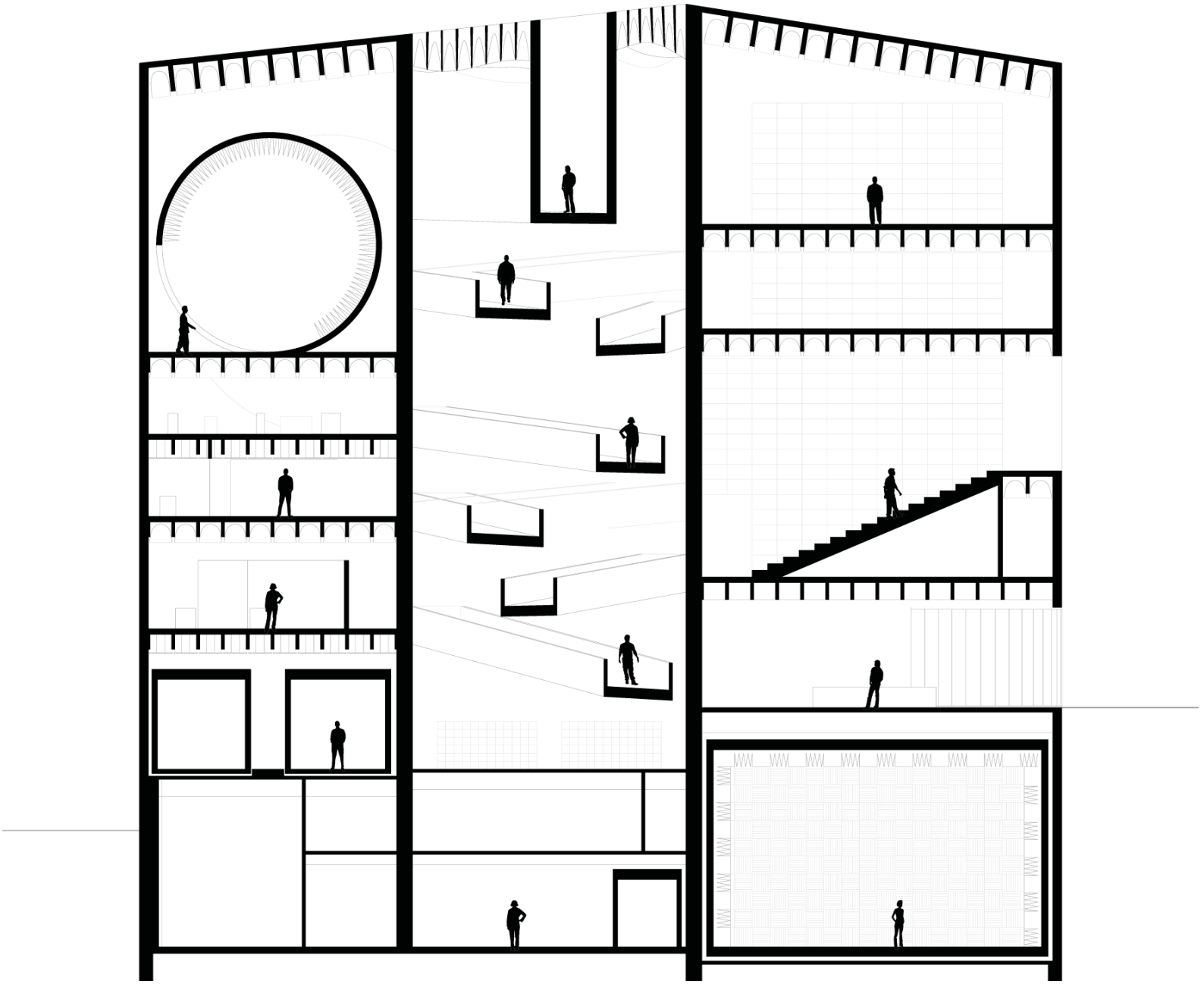


2ND FLOOR PLAN



BRIDGES DIAGRAM

ATRIUM SPACE



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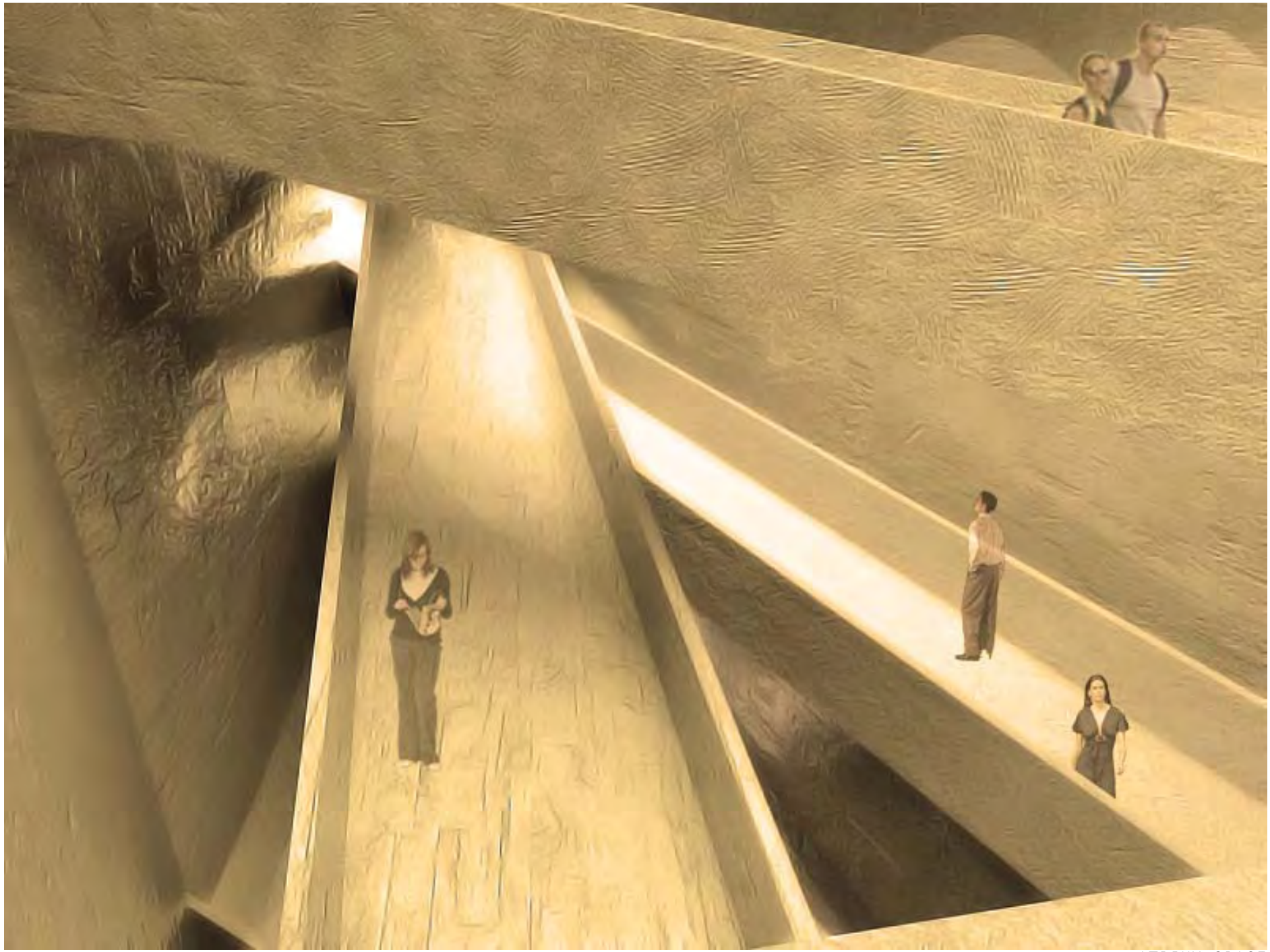
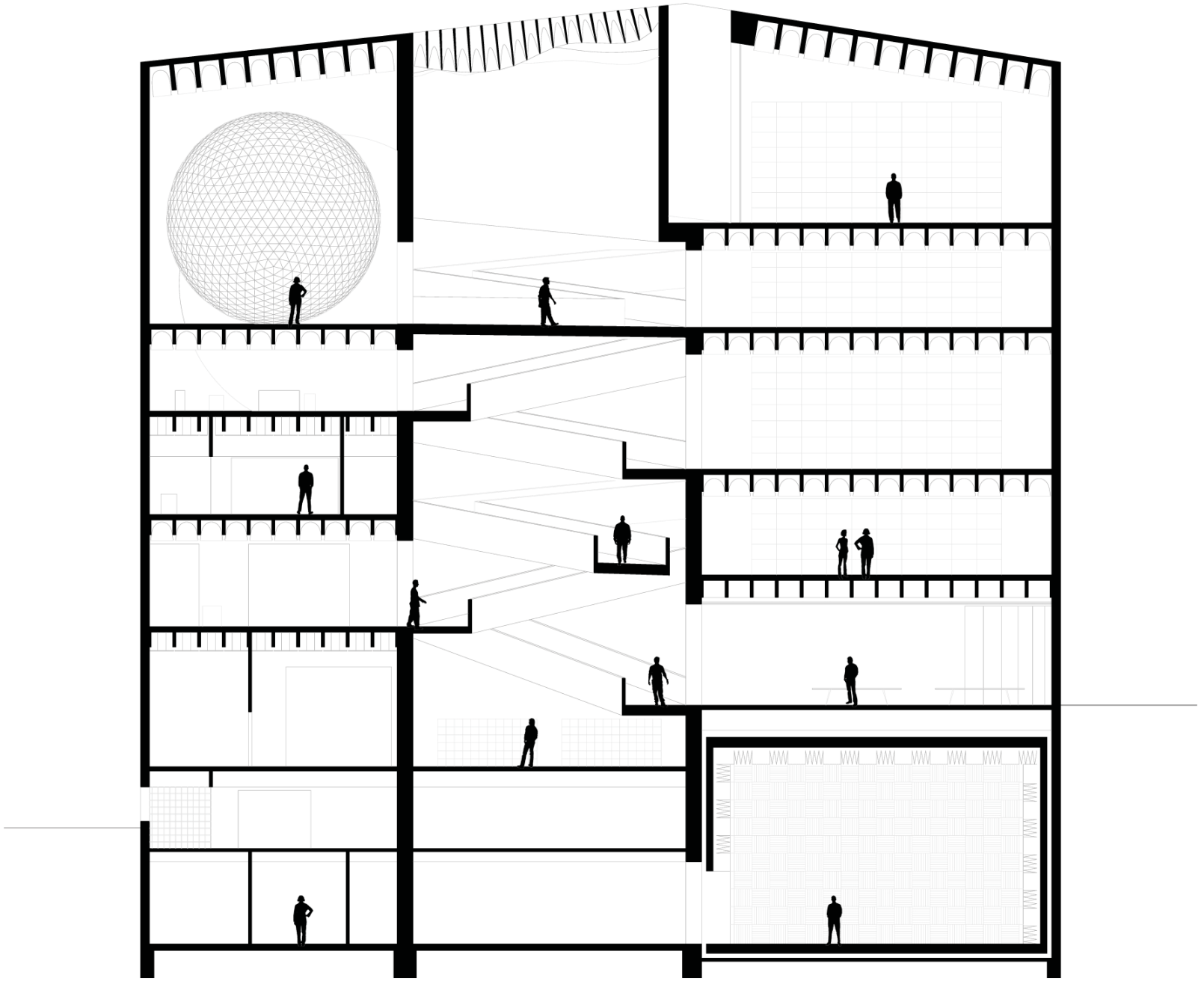
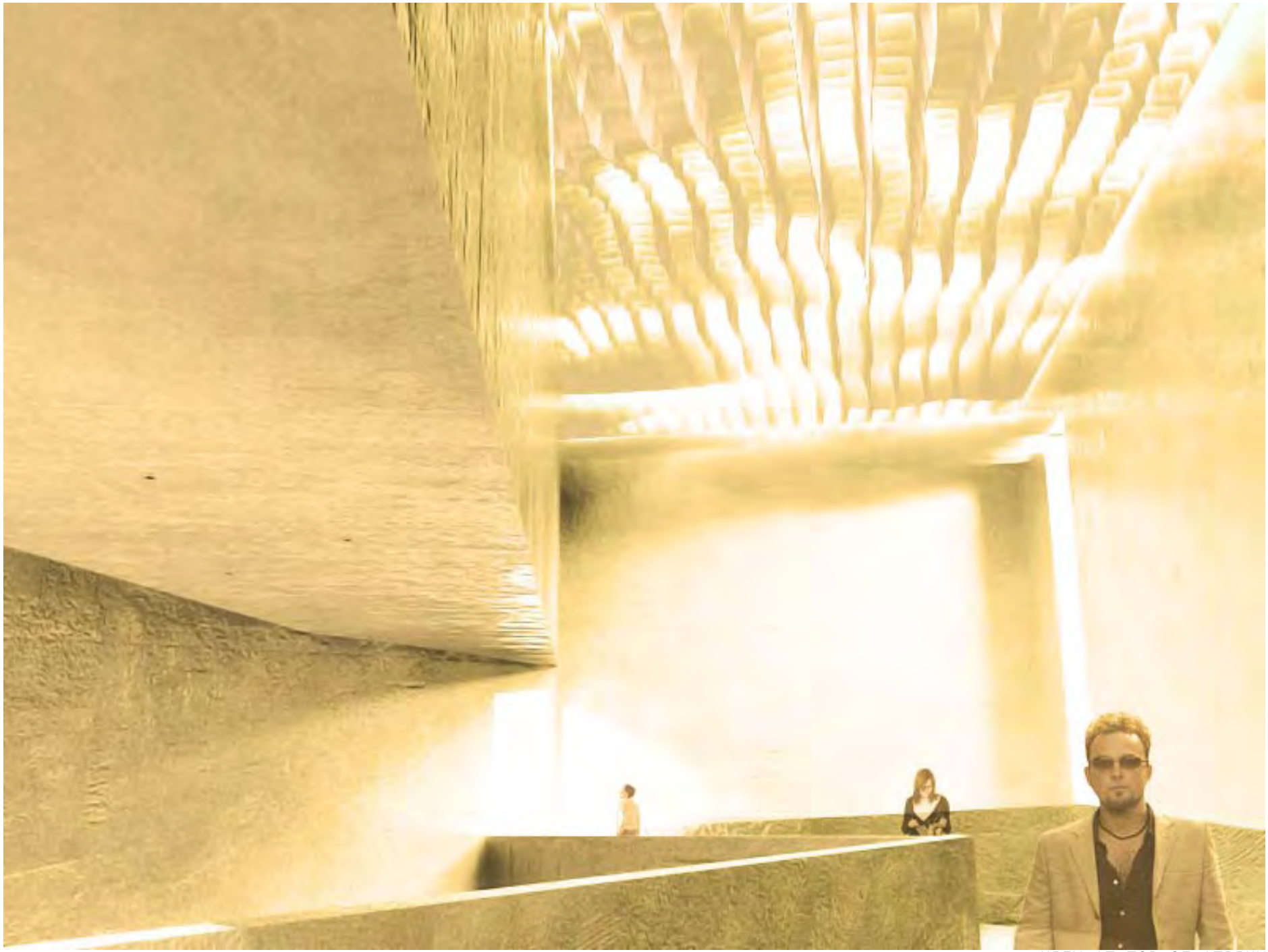


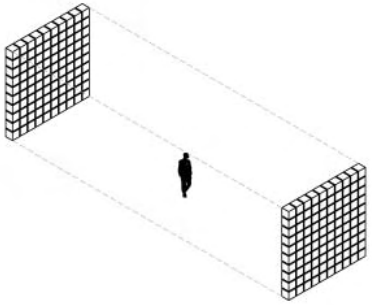
ATRIUM SPACE

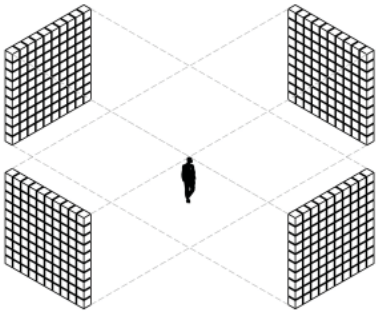


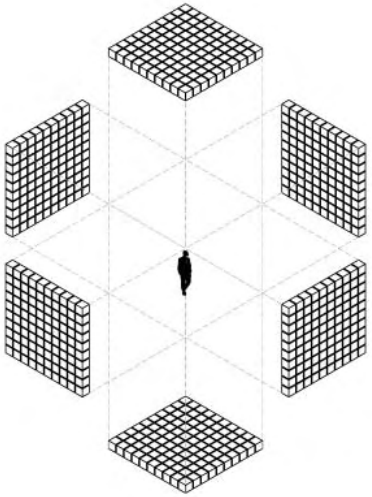
TRANSVERSE SECTION

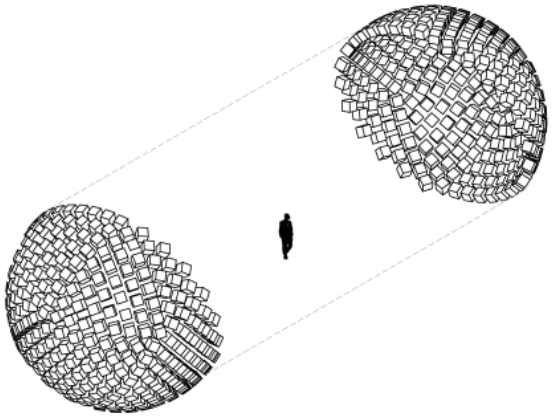


VIEW AT TOP OF ATRIUM

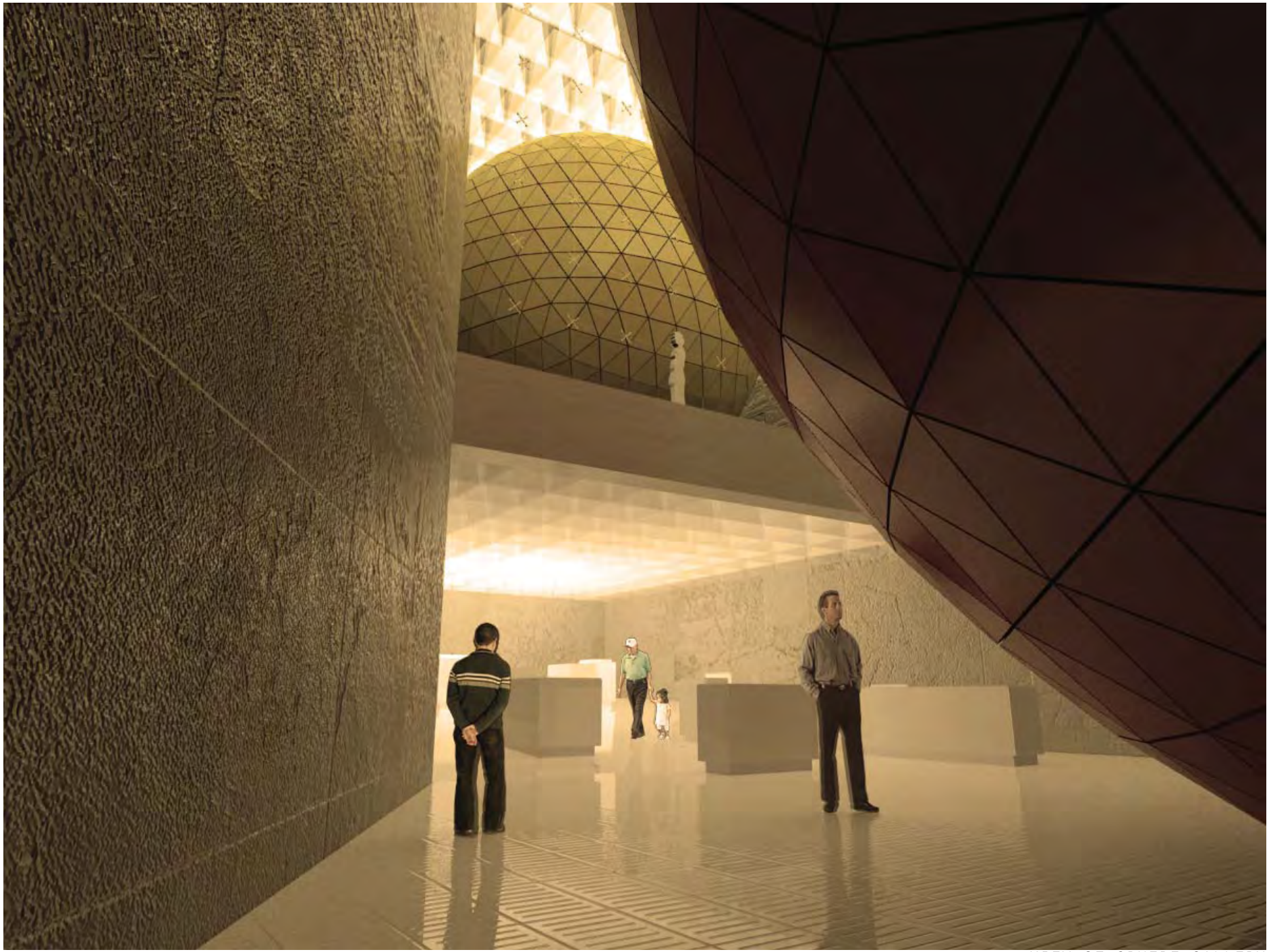




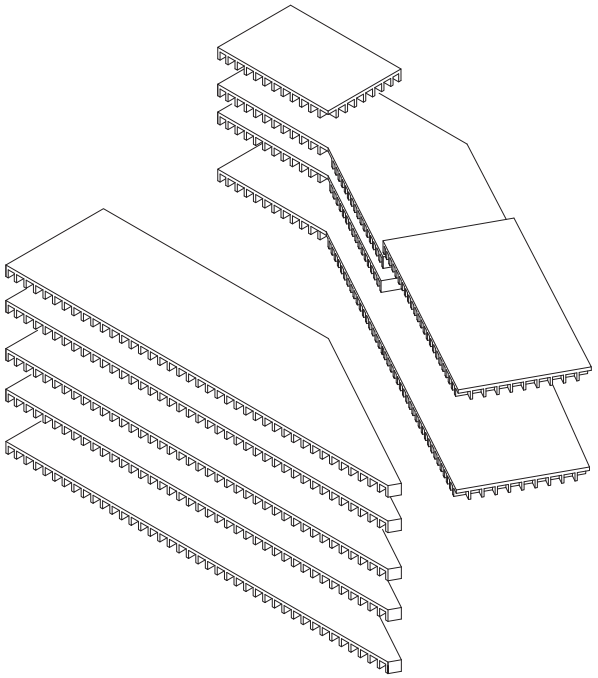




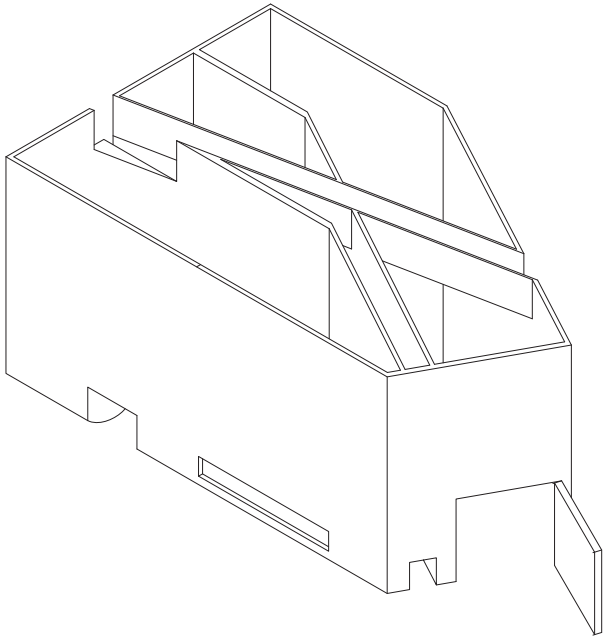
EVOLUTION OF SOUND SPACE. CUBES REPRESENT SPEAKERS AND VECTORS



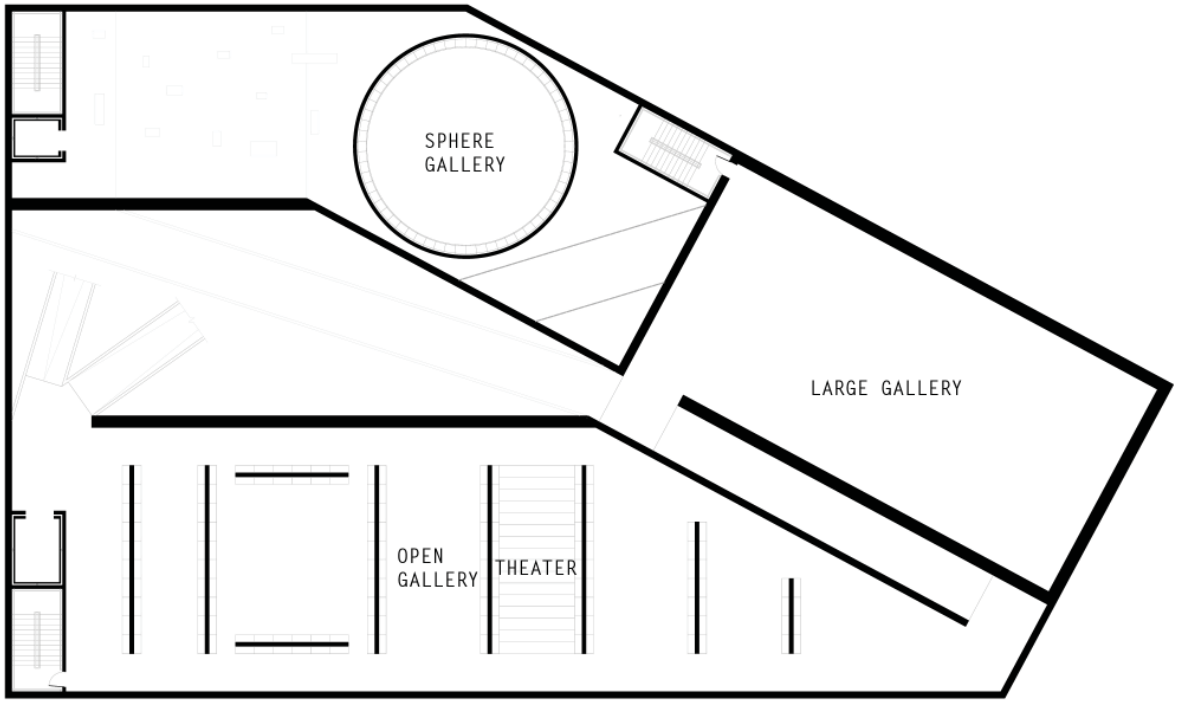
VIEW OF SPHERE GALLERY



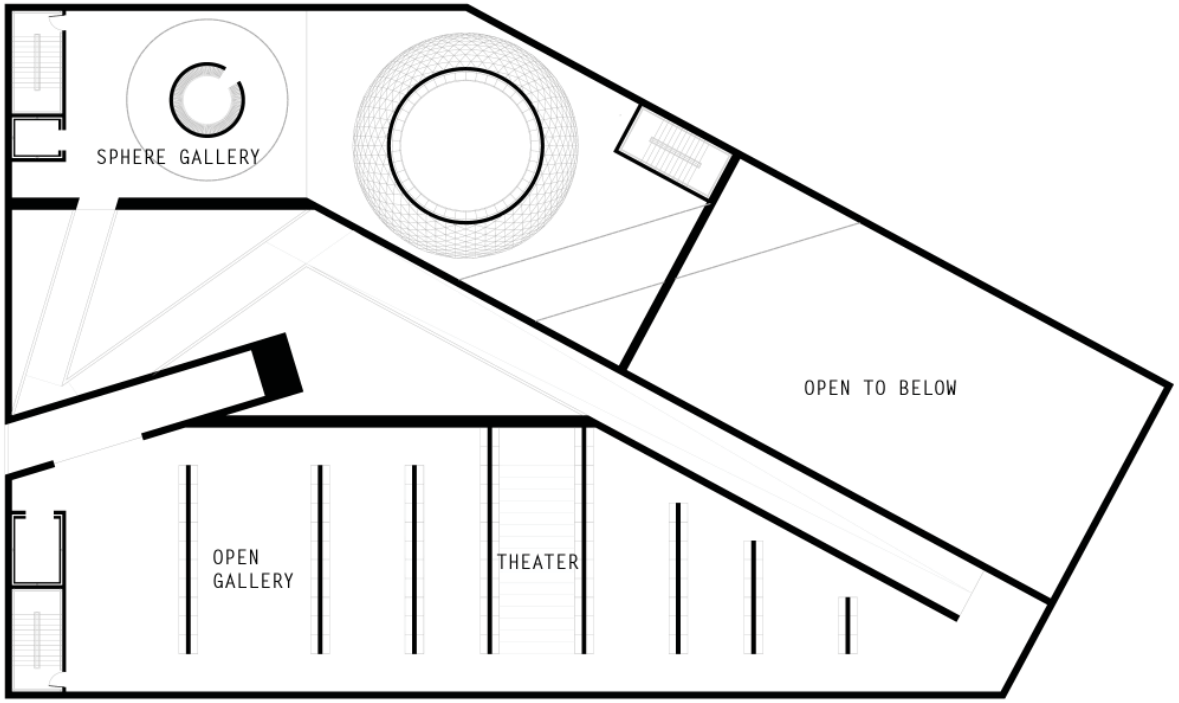
STRUCTURAL FLOORS DIAGRAM



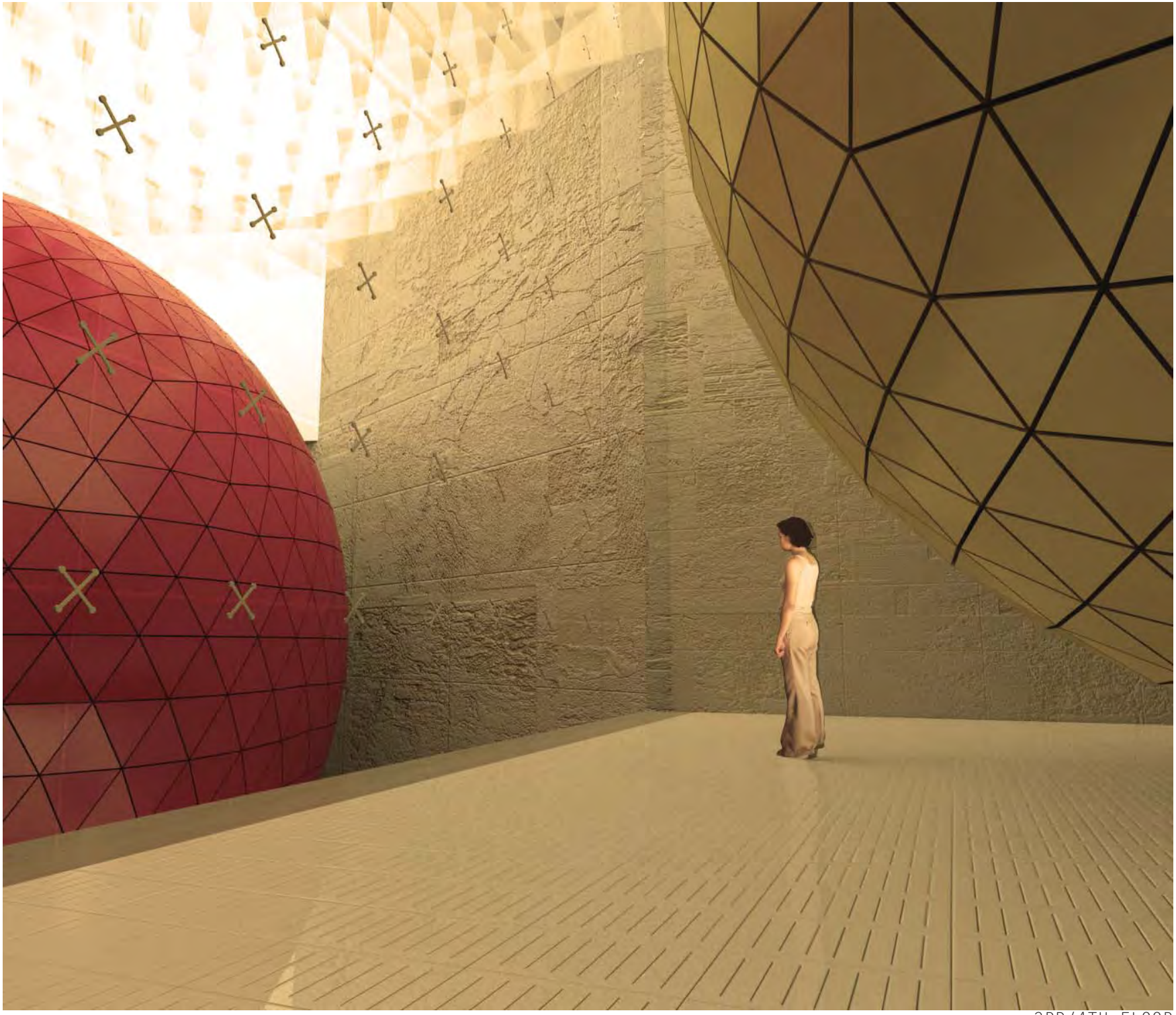
STRUCTURAL WALLS DIAGRAM

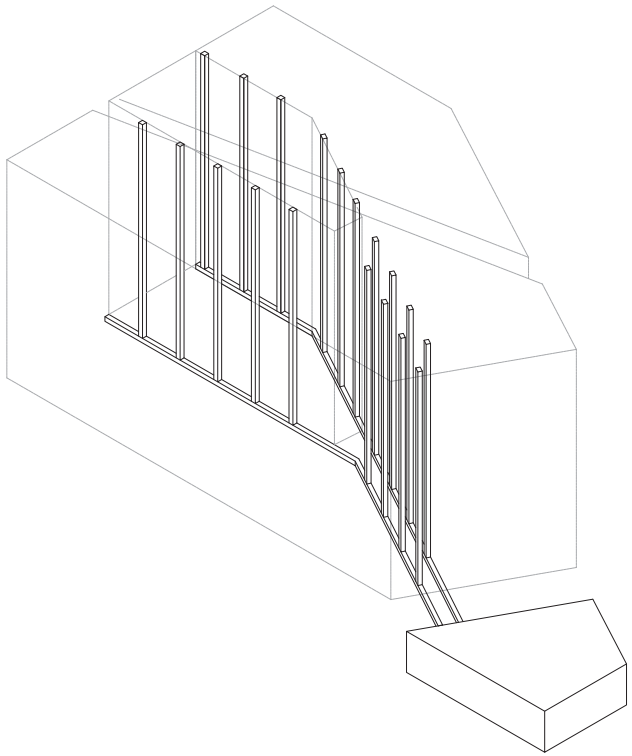


3RD FLOOR

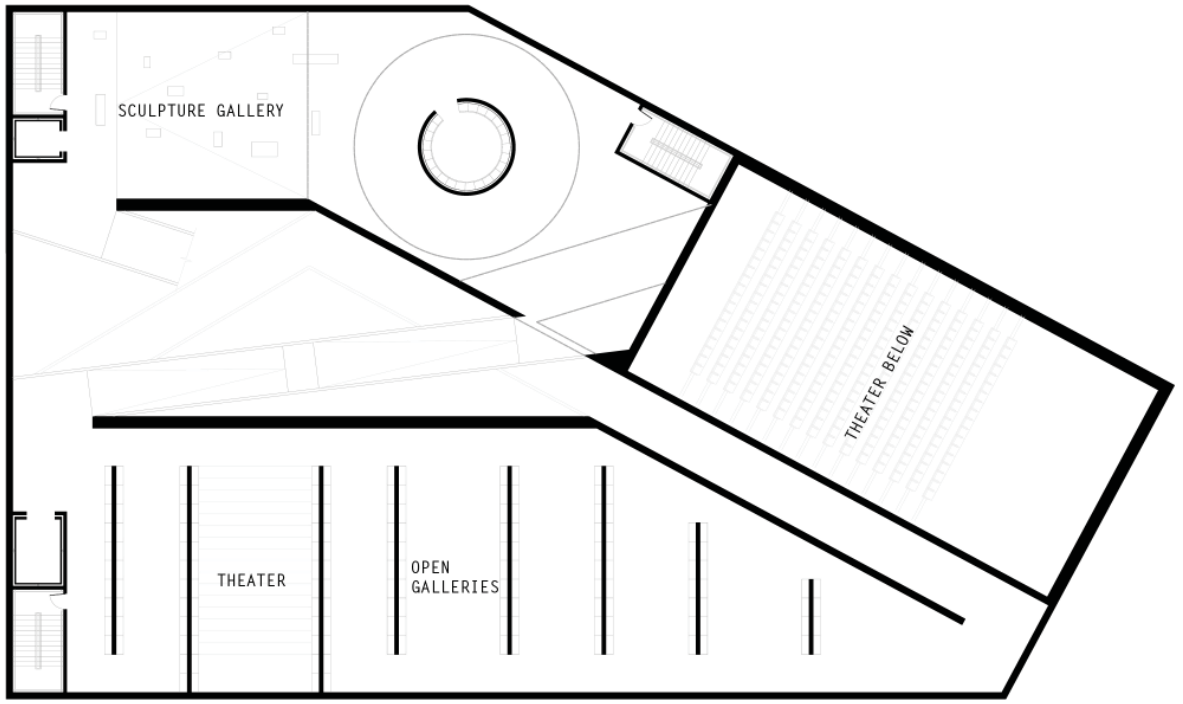


4TH FLOOR

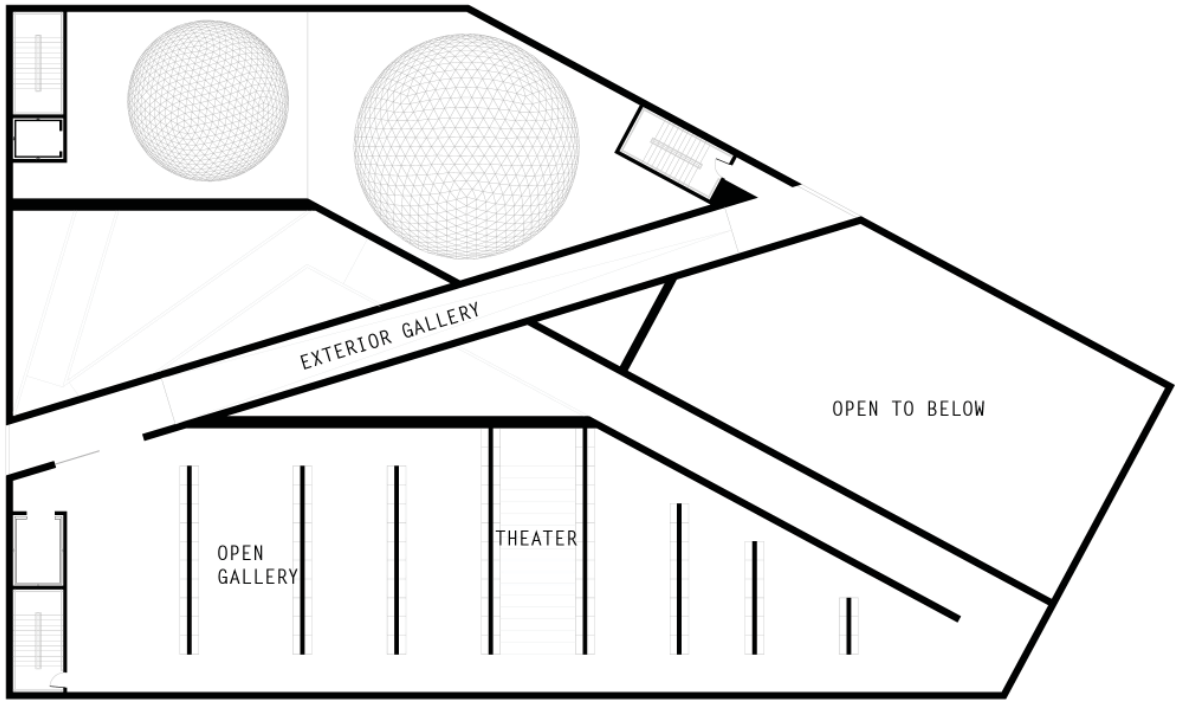




MECHANICAL DIAGRAM

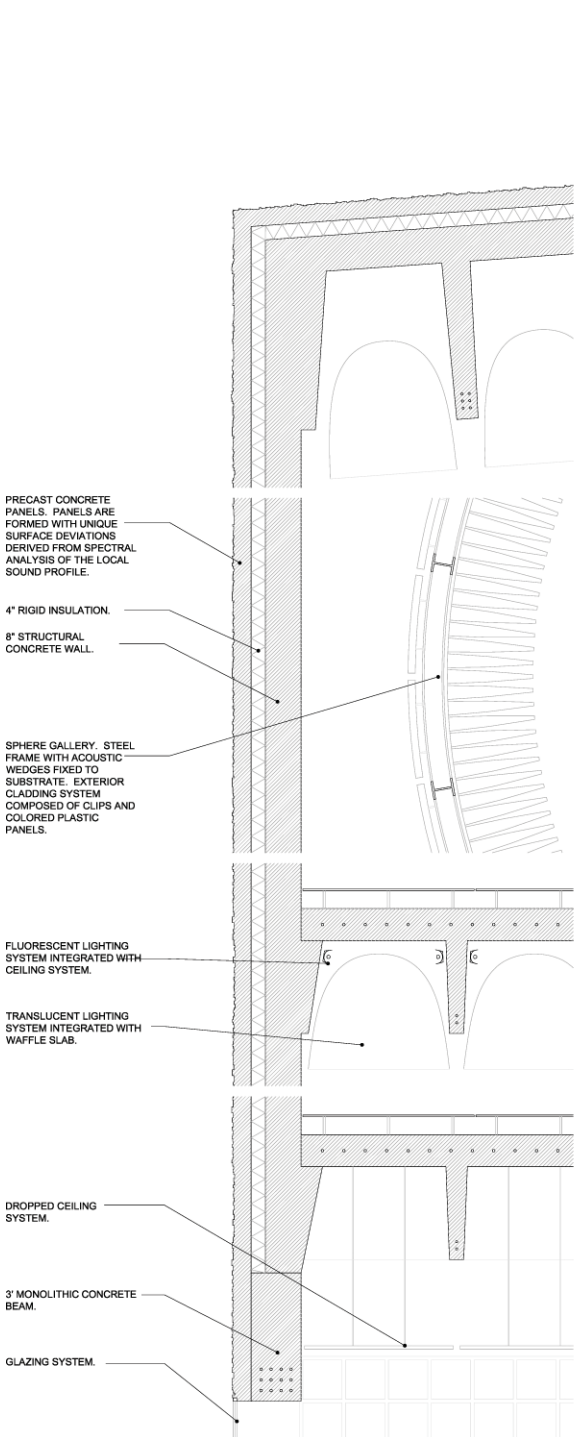


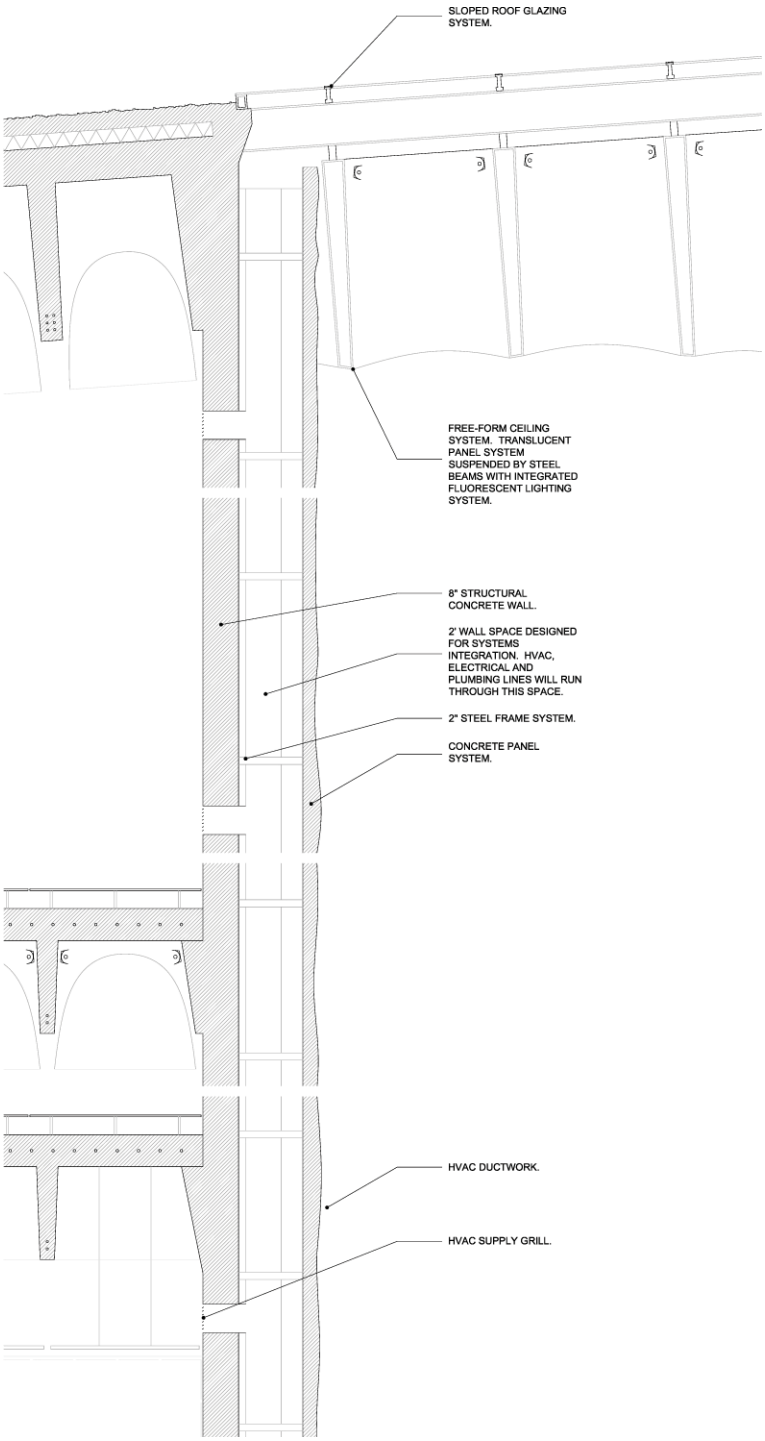
5TH FLOOR

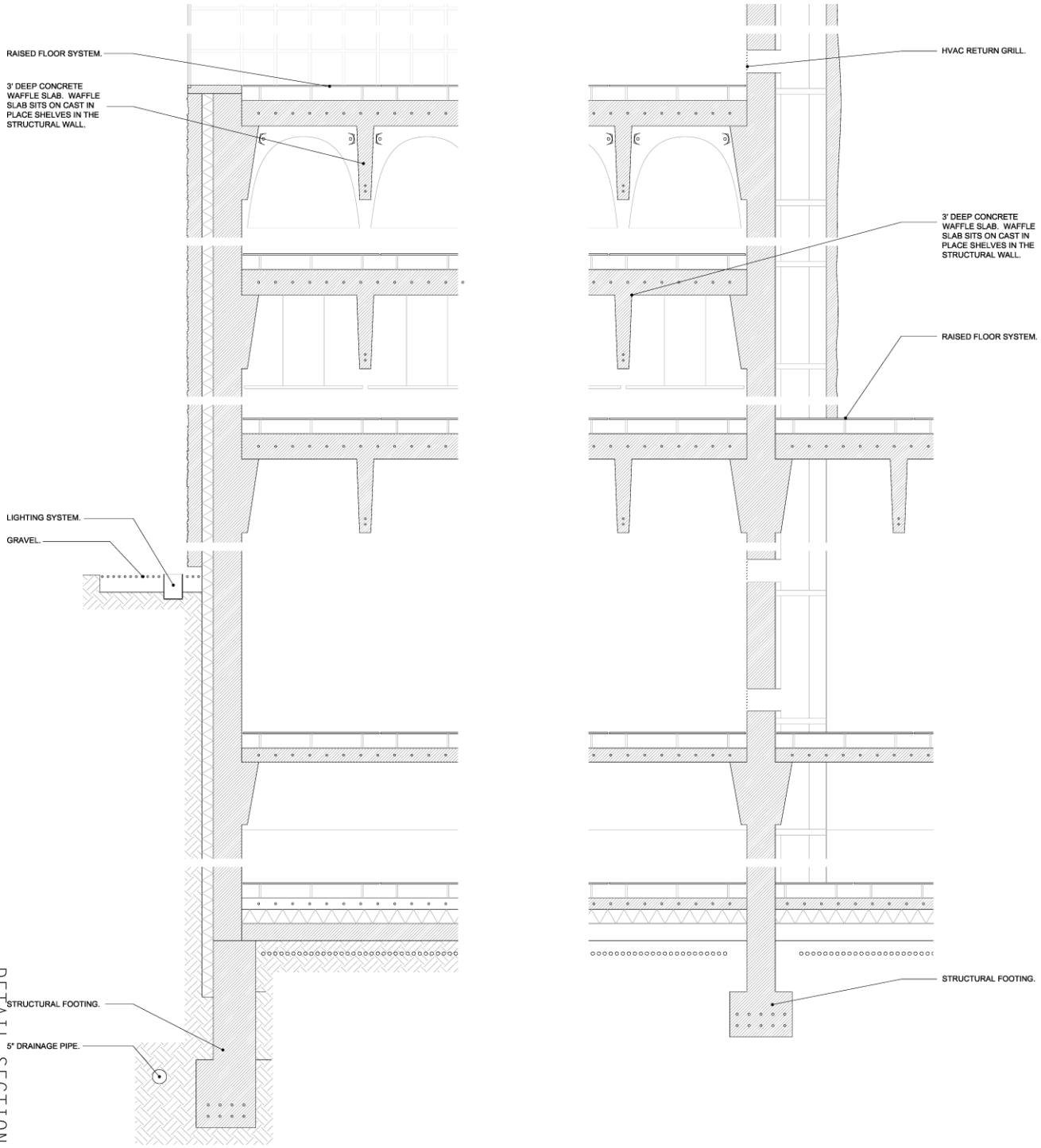


SIXTH FLOOR

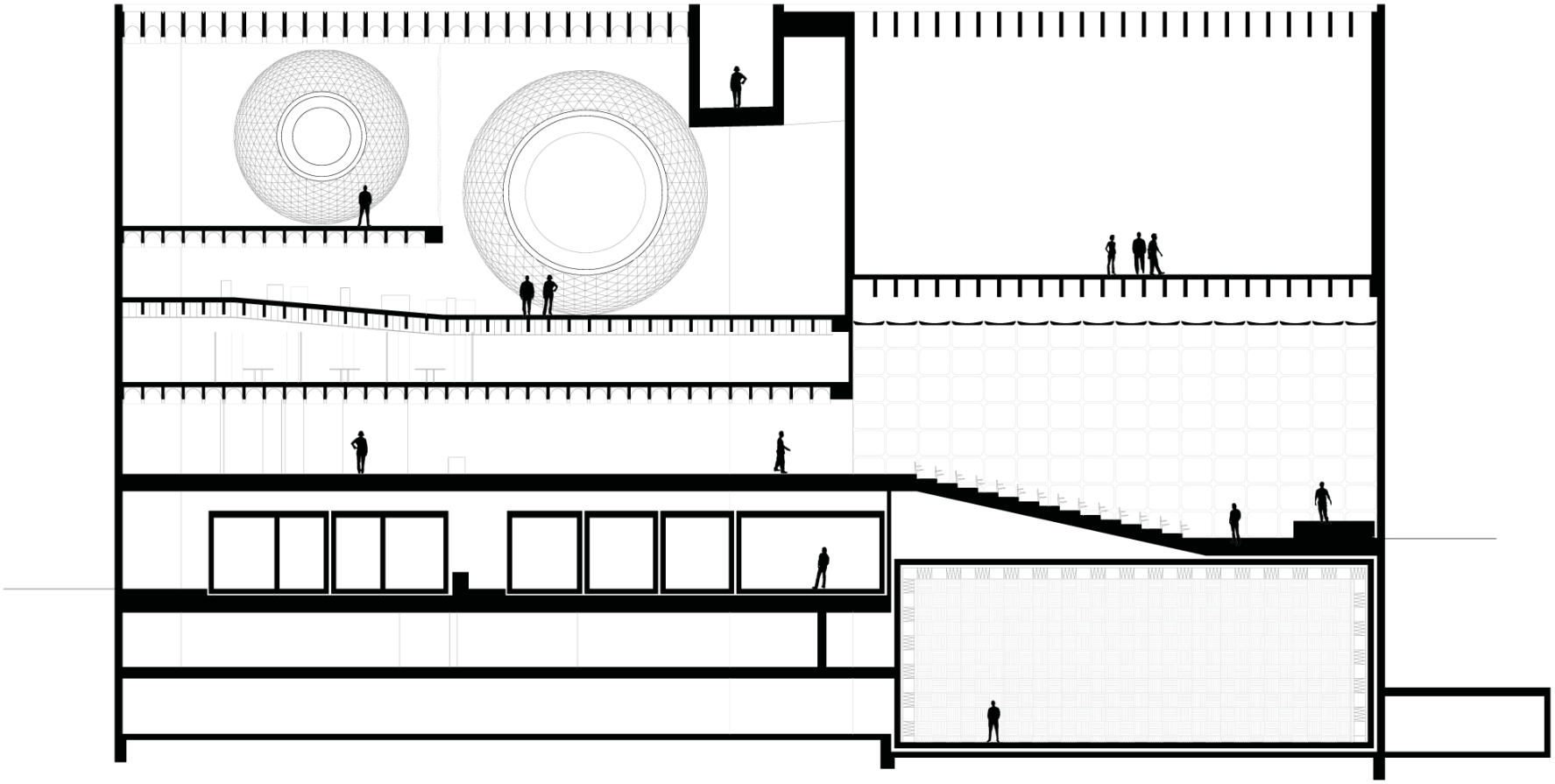
SOUND GALLERY PERSPECTIVE


PRECAST CONCRETE PANELS. PANELS ARE FORMED WITH UNIQUE SURFACE DEVIATIONS DERIVED FROM SPECTRAL ANALYSIS OF THE LOCAL SOUND PROFILE.
4" RIGID INSULATION.
8" STRUCTURAL CONCRETE WALL.
SPHERE GALLERY. STEEL FRAME WITH ACOUSTIC WEDGES FIXED TO SUBSTRATE. EXTERIOR CLADDING SYSTEM COMPOSED OF CLIPS AND COLORED PLASTIC PANELS.
FLUORESCENT LIGHTING SYSTEM INTEGRATED WITH CEILING SYSTEM.
TRANSLUCENT LIGHTING SYSTEM INTEGRATED WITH WAFFLE SLAB.
DROPPED CEILING SYSTEM.
3' MONOLITHIC CONCRETE BEAM.
GLAZING SYSTEM.


SLOPED ROOF GLAZING SYSTEM.
FREE-FORM CEILING SYSTEM. TRANSLUCENT PANEL SYSTEM SUSPENDED BY STEEL BEAMS WITH INTEGRATED FLUORESCENT LIGHTING SYSTEM.
8" STRUCTURAL CONCRETE WALL.
2' WALL SPACE DESIGNED FOR SYSTEMS INTEGRATION. HVAC, ELECTRICAL AND PLUMBING LINES WILL RUN THROUGH THIS SPACE.
2" STEEL FRAME SYSTEM.
CONCRETE PANEL SYSTEM.
HVAC DUCTWORK.
HVAC SUPPLY GRILL.



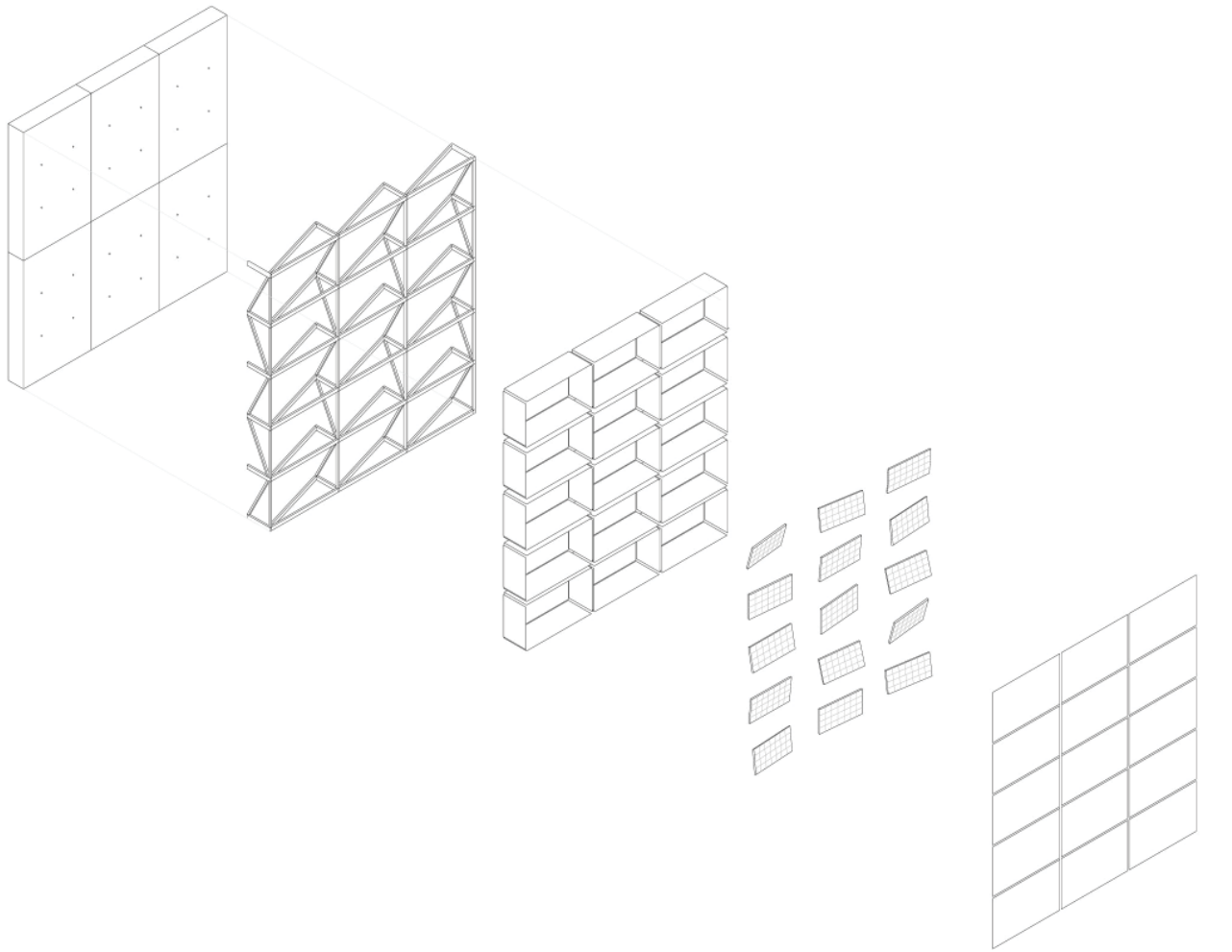
DETAIL SECTION



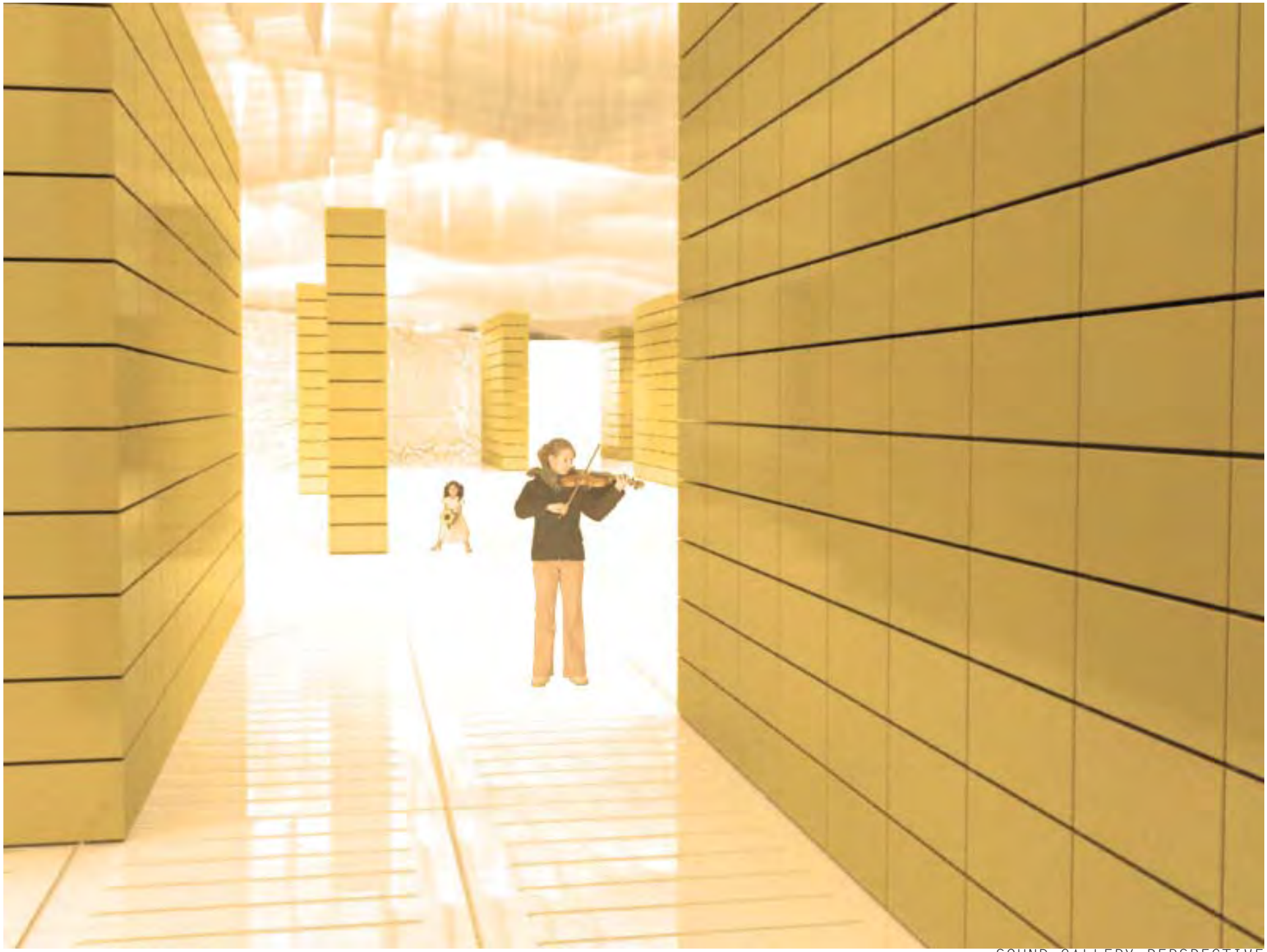
LONGITUDINAL SECTION

BRIDGE/SOUND GALLERY PERSPECTIVE

THE GALLERY WALLS ARE DESIGNED TO EXHIBIT SOUND. THE GALLERIES HOUSE A SERIES OF SPEAKER SYSTEMS WITH A WIDE RANGE OF TONAL AND DIRECTIONAL CAPABILITIES. THESE SPEAKERS ARE THEN COORDINATED TO EXHIBIT SOUND-BASED SPATIAL COMPOSITIONS. THE WALLS ARE DESIGNED TO ISOLATE INDIVIDUAL PERFORMANCES BY PROVIDING INSULATED STRUCTURAL PANELS. THESE PARTITIONS ALLOW THE DISPLAY OF MULTIPLE EXHIBITIONS WITHIN AN OPEN PLAN ENVIRONMENT WHICH STREAMLINES CIRCULATION BETWEEN THE MUSEUMS MANY GALLERY SPACES

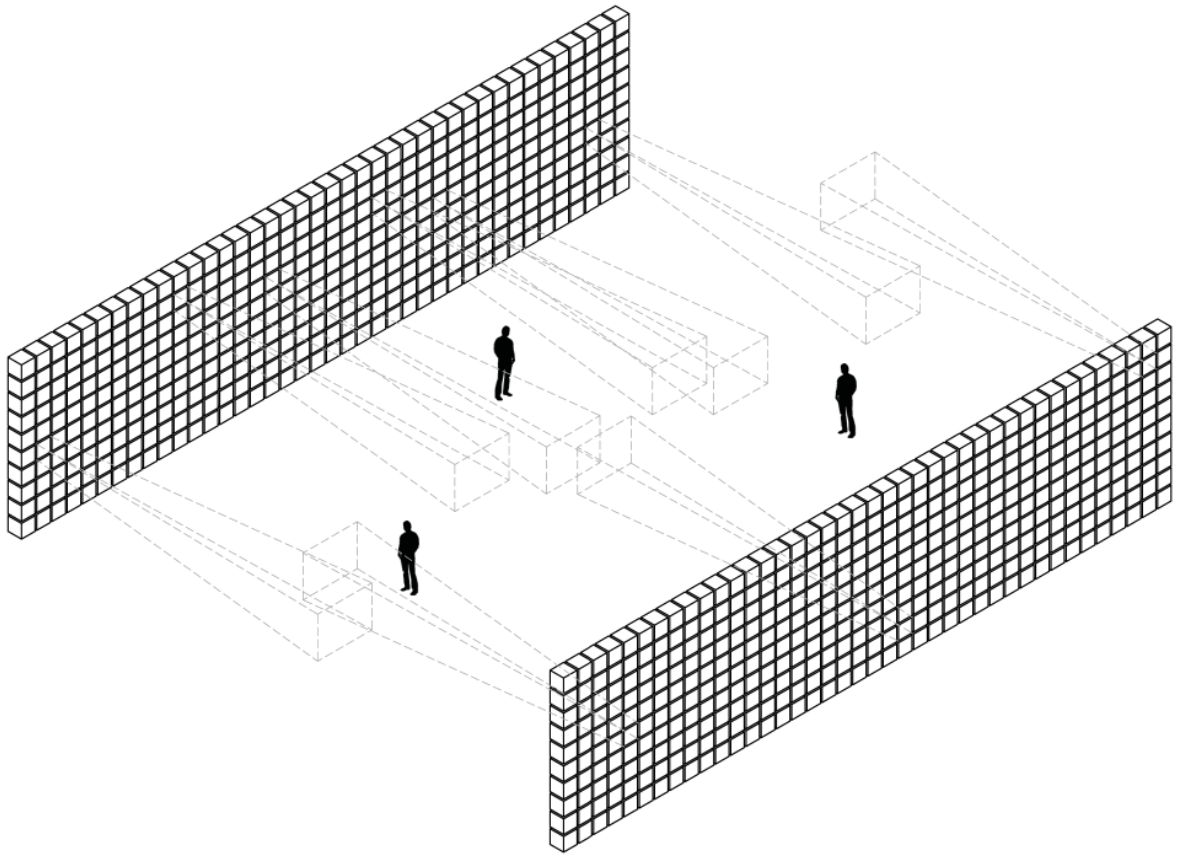


SOUND WALL CONSTRUCTION AXON



SOUND GALLERY PERSPECTIVE

THE GALLERIES AS DESIGNED, WOULD PRODUCE A NUMBER OF ACOUSTIC PROBLEMS ASSUMING TRADITIONAL SPEAKER TECHNOLOGIES WERE EMPLOYED. WHAT MAKES THE GALLERY WALL CONFIGURATIONS ACOUSTICALLY FEASIBLE IS THE IMPLEMENTATION OF A RELATIVELY NEW TECHNOLOGY CALLED THE AUDIO SPOTLIGHT. THIS TECHNOLOGY USES HIGHER FREQUENCY WAVES TO GENERATE SOUND THAT CAN BE FOCUSED MUCH LIKE THE BEAM OF A FLASHLIGHT. THE DIAGRAM TO THE RIGHT INDICATES THE RELATIVE SHAPE OF SOUND EMITTED BY A SERIES OF SPEAKERS EMBEDDED IN THE GALLERY WALLS, AS DEPICTED IN THE DIAGRAM A NUMBER OF PATRONS CAN SHARE THE SAME SPACE BOUND BY TWO WALLS, BUT CAN BE EXPERIENCING TOTALLY DIFFERENT SONIC COMPOSITIONS.

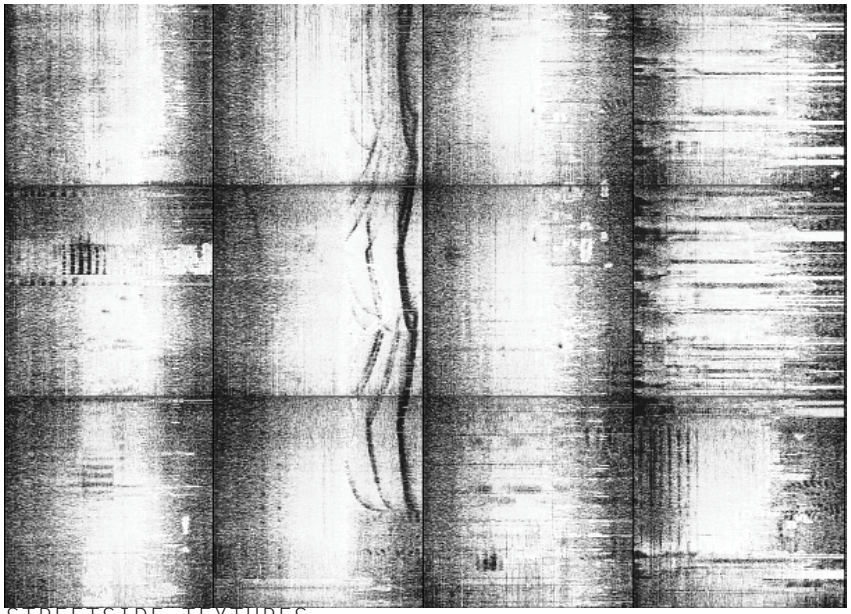


SOUND BOUNDARIES. SEE APPENDIX FOR TECHNICAL SPECIFICATIONS

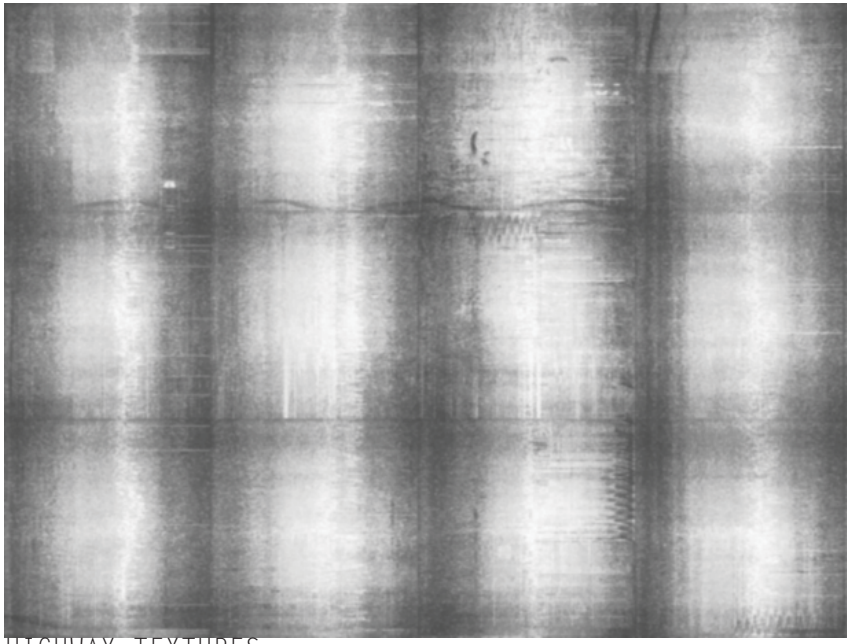
FACADE DEVELOPMENT

THE FACADE IS A COMPOSITION OF CONCRETE TILES STAMPED WITH PATTERNS AND TEXTURES DERIVED FROM THE SOUND RECORDINGS AT THE SITE. THE PATTERNS ARE ENHANCED VERSIONS OF THE SPECTRAL ANALYSIS IMAGES. THESE COMPOSITIONS REFLECT THE SOUND CHARACTER OF THE ENVIRONMENT MOST DIRECTLY ASSOCIATED WITH EACH EXTERIOR WALL PLANE; MEANING THAT THE FACADES FACING THE HIGHWAY SHOW PATTERNS OF THE HIGHWAY SOUNDS AND THE STREETSIDE FACADES REFLECT PATTERNS REFLECTING THE SOUND EVENTS ALONG THE STREET.

THE IMAGES ARE IMPRESSED UPON THE CONCRETE TO EMPHASIZE EVENTS AND PATTERNS FROM WALKING AND AUTOMOBILES IN THE CASE OF THE STREETSIDE TEXTURES. THE HIGHWAY TEXTURES HAVE BEEN HOMOGENIZED TO PRODUCE A SMOOTHER EFFECT THAT INDICATES THE CONTINUOUS, FLOWING NATURE OF THE HIGHWAY.

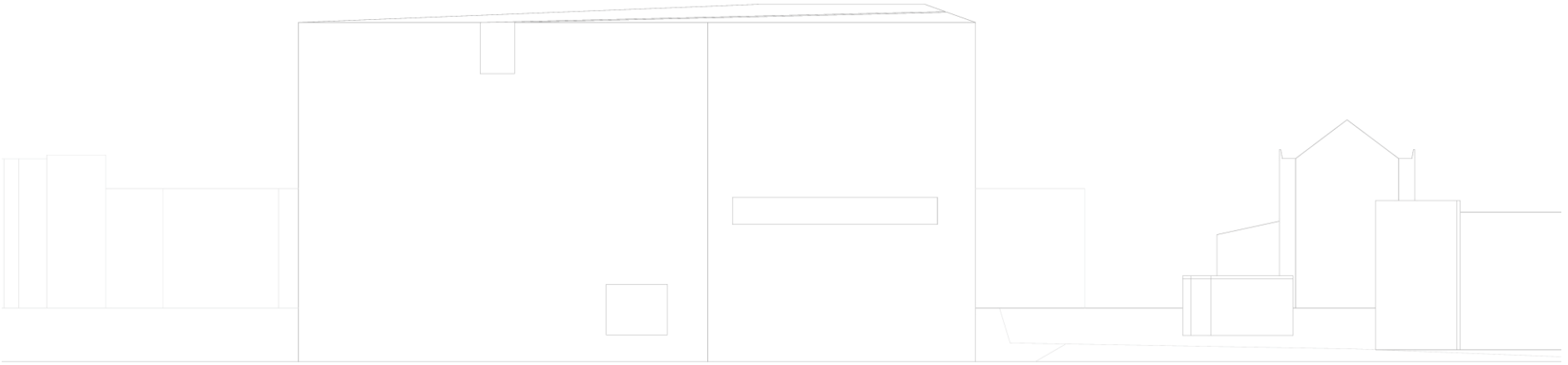


STREETSIDE TEXTURES



HIGHWAY TEXTURES

EAST ELEVATION

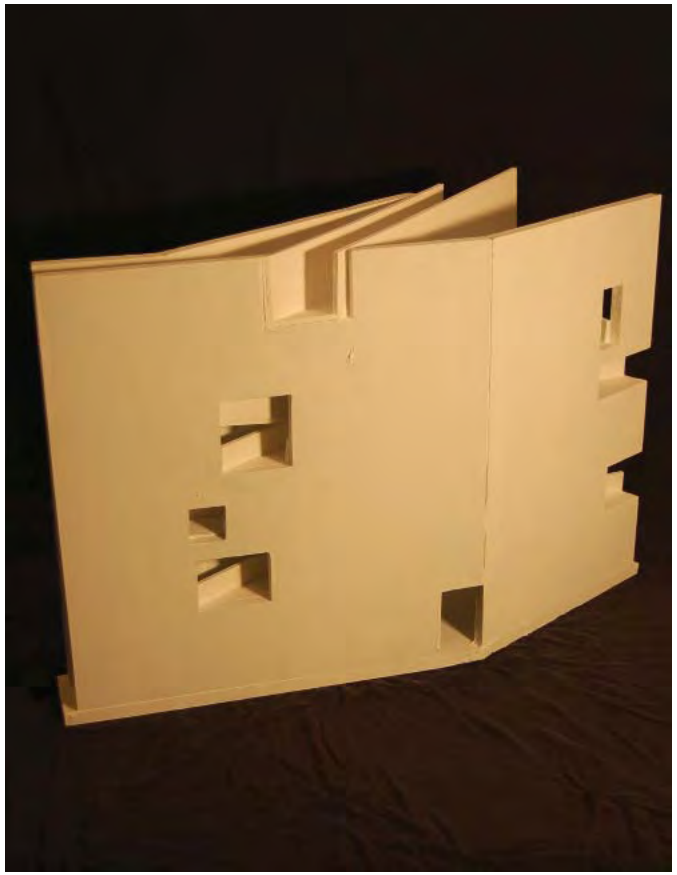


SOUTH ELEVATION

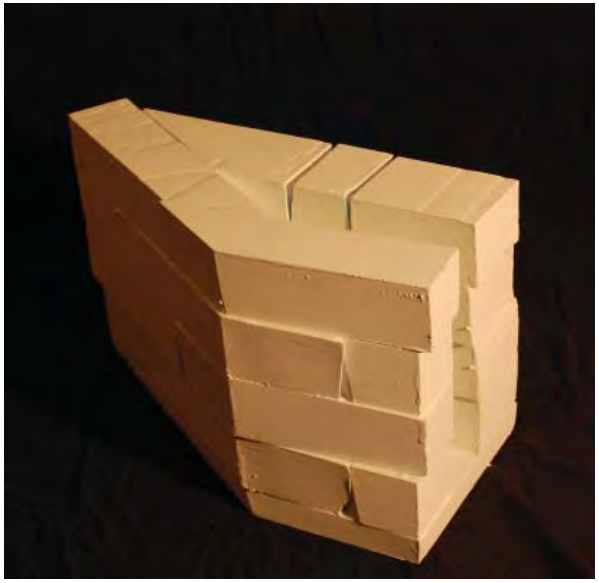
SITE SECTION

VIEW FROM I-90

PHYSICAL MODELS



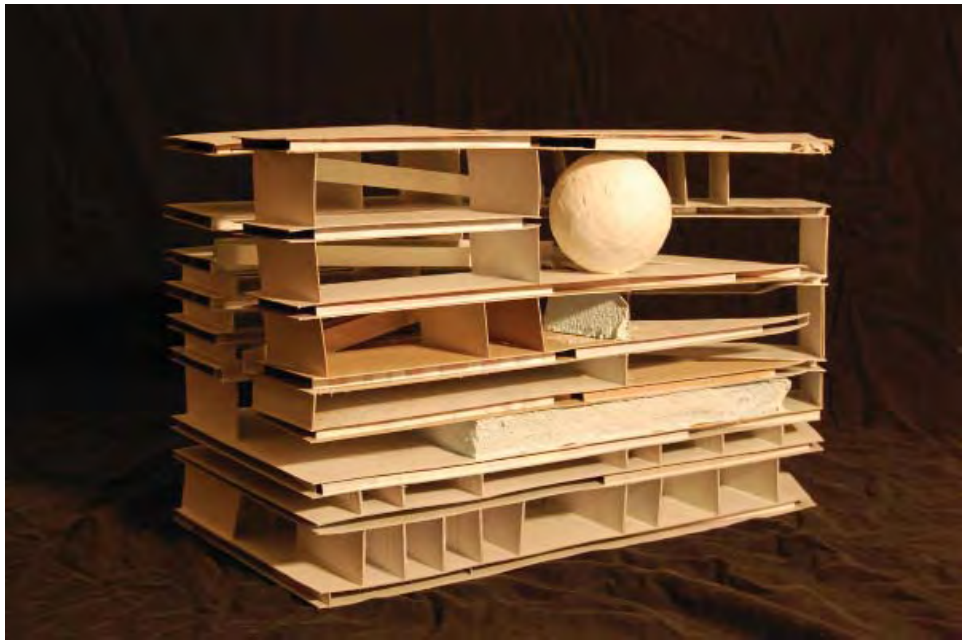
1/2”=1’ SCALE DETAIL MODEL OF ATRIUM



1/16”=1’ SCALE STUDY MODEL OF BSC

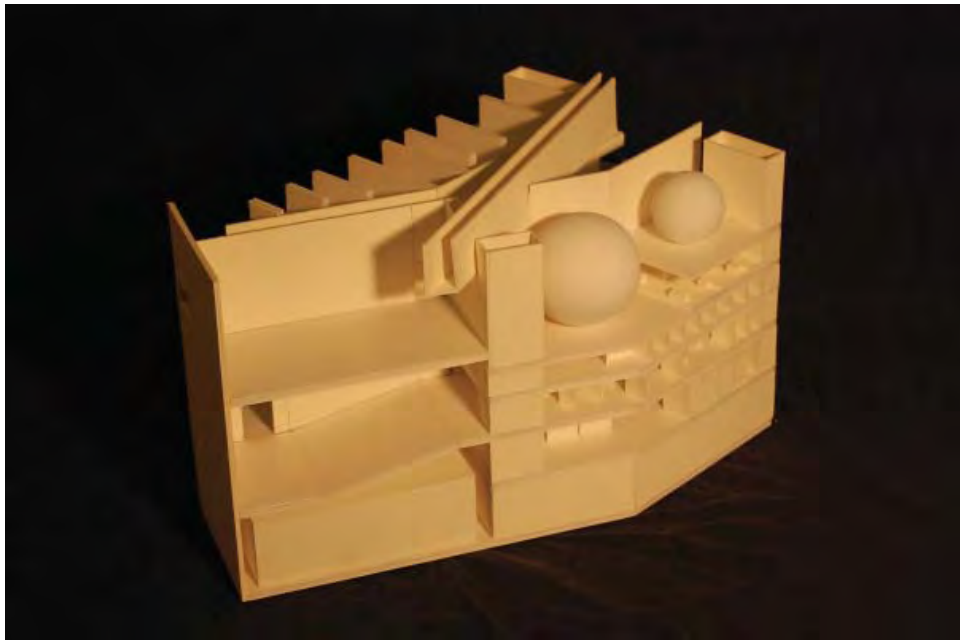
1/16”=1’ SCALE STUDY MODEL OF BSC

1/16”=1’ SCALE STUDY MODEL OF BSC

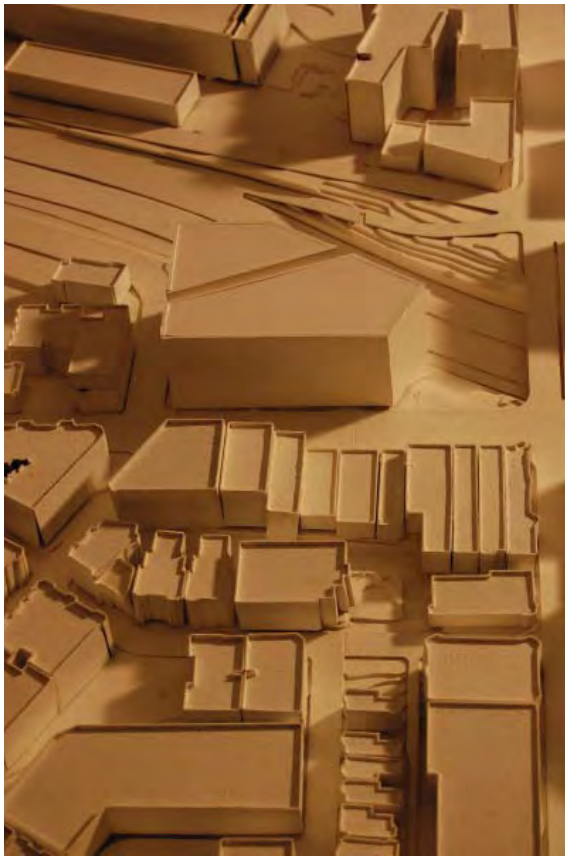


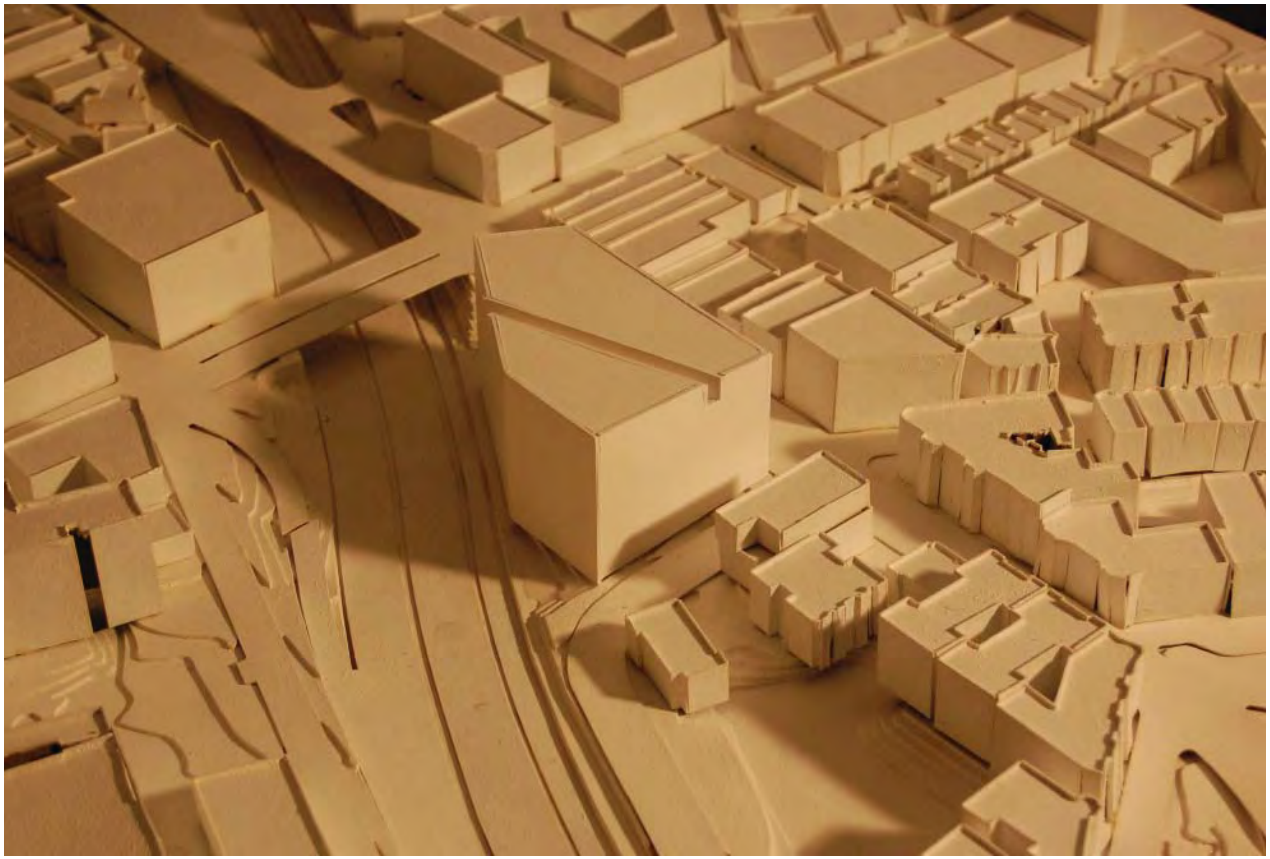
1/16”=1’ SCALE STUDY MODEL OF BSC

1/16”=1’ SCALE MODEL OF BSC



1/16”=1’ SCALE MODEL OF BSC

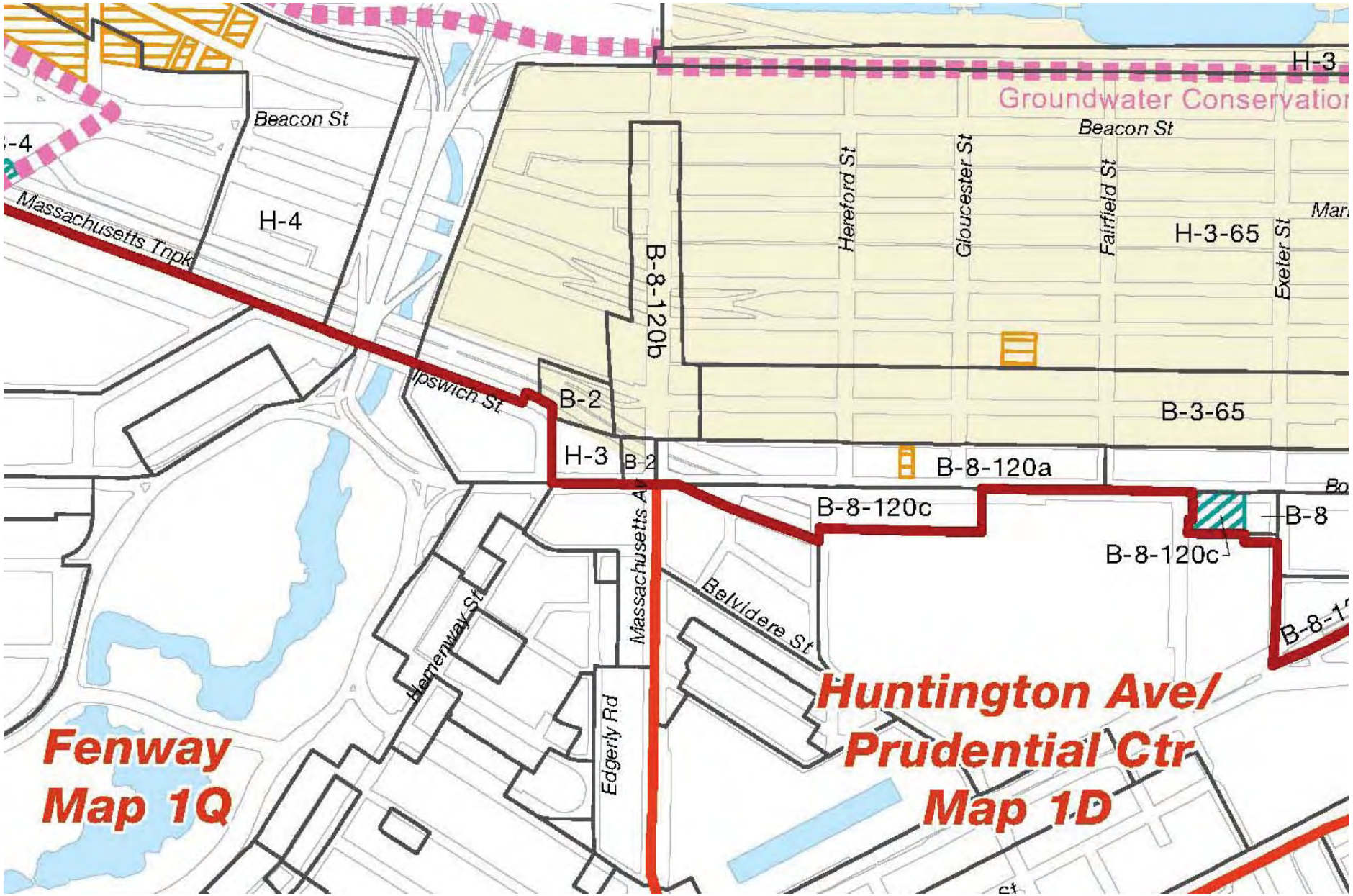




1”=50’ SCALE SITE MODEL

1”=50’ SCALE SITE MODEL

ZONING INFORMATION


Beacon St
Massachusetts Tnpk
H-4
H-3
Groundwater Conservation
Beacon St
Hereford St
Gloucester St
Fairfield St
Exeter St
H-3-65
B-8-120b
Ipswich St
B-2
H-3
B-2
B-3-65
B-8-120a
B-8-120c
B-8
B-8-120c
Massachusetts Av
Belvidere St
Hemenway St
Edgerly Rd
Fenway
Map 1Q
Huntington Ave/
Prudential Ctr
Map 1D

NOTE: ALL TEXTS ARE EXCERPTS FROM THE BOSTON REDEVELOPMENT ZONING DOCUMENTS.

EXCERPT FROM ARTICLE 3 : ESTABLISHMENT OF ZONING DISTRICTS

^SECTION 3-1. Division of City Into Districts. For the purposes of this code, the City is hereby divided into districts as follows: three classes of residential districts: S (single family), R (general), and **H (apartment)**; two classes of business districts: L (local) and B (general); seven classes of industrial districts: LM (light manufacturing), M (restricted manufacturing), I (general), MER (maritime economy reserve), W (waterfront), WM (waterfront manufacturing), and WS (waterfront service); one class of open space district: OS (open space); downtown districts (established pursuant to Section 3-1C), as listed in Subsection (e) of this Section; neighborhood districts (established pursuant to Section 3-1B), as listed in Subsection (f) of this Section; the Harborpark District (established pursuant to Section 3-1D), as listed in Subsection (g) of this Section; and special districts (established pursuant to Section 3-1E), as listed in Subsection (h) of this Section. Land in private ownership shall not be included in the open space class of district without the written consent of the owner.

NOTE: ALL TEXTS ARE EXCERPTS FROM THE BOSTON REDEVELOPMENT ZONING DOCUMENTS.

THE FOLLOWING TABLE PRESENTS INFORMATION CONCERNING SETBACK, BUILDING HEIGHT AND FAR REGULATIONS:

^TABLE B: DIMENSIONAL REGULATIONS

NOTE: Figures in parentheses refer to footnotes below table.
If a district with a second numerical suffix (e.g., H-2-55) is not listed in this Table, see footnote (15) and Section 3-1A(i).

DISTRICT	TYPE OF USE	LOT SIZE minimum sq.ft.	LOT AREA minimum sq.ft. for each add'l dwell. unit	LOT WIDTH minimum feet	FLOOR AREA RATIO maximum (1)	HEIGHT OF BUILDINGS maximum stories	HEIGHT OF BUILDINGS maximum feet	USABLE OPEN SPACE minimum sq.ft. per dwell. unit	FRONT YARD minimum depth feet (14)	SIDE YARD minimum width feet	REAR YARD minimum depth feet	SETBACK OF PARAPET minimum distance from lot line		REAR YARD maximum % occup. by accessory buildings
H-1	1 & 2 family row	2,000	1,500	none	1.0	none	none(15)	400	20	(4)	30(6)	$\frac{H+L}{6}^{1}$	for	25
	Any other dwelling	5,000	1,000	50	1.0	none	none(15)	400	20	(4)	$10+\frac{L}{4}$(6)		all	25
	Other use	5,000	1,000	50	1.0	none	none(15)	none	25	(4)	20		uses	25
H-2	Any dwelling	none	none	none	2.0	none	none(15)	150	20	(4)	$10+\frac{L}{4}$(6)	$\frac{H+L}{6}^{1}$	all	30
	Other use	none	none	none	2.0	none	none(15)	none	20	(4)	20		uses	30
H-3-65	Any dwelling	none	none	none	3.0	-	65(9)	50	(10)	(4)	25% of	$\frac{H+L}{6}^{1}$ (9)	all	40
	Other use	none	none	none	3.0	-	65(9)	none	(10)	(4)	lot depth all uses		uses	40
H-3	Any dwelling	none	none	none	3.0	none	none(15)	100	15	(4)	$10+\frac{L}{4}$(6)	$\frac{H+L}{6}^{1}$	all	35
	Other use	none	none	none	3.0	none	none(15)	none	15	(4)	20		uses	35
H-4	Any dwelling	none	none	none	4.0	none	none	50	15	(4)	$10+\frac{L}{4}$(6)	$\frac{H+L}{6}^{1}$	all	40
	Other use	none	none	none	4.0	none	none	none	15	(4)	20		uses	40
H-5	Any dwelling	none	none	none	5.0	none	none(13)(15)	50	15	(4)	$10+\frac{L}{4}$(6)	$\frac{H+L}{6}^{1}$	all	40
	Other use	none	none	none	5.0	none	none(13)(15)	none	15	(4)	20		uses	40

NOTE: ALL TEXTS ARE EXCERPTS FROM THE BOSTON REDEVELOPMENT ZONING DOCUMENTS.

EXCERPT FROM ARTICLE 8 : REGULATION OF USES

District

NO.	USE ITEM	S	R	H	L	B	M	I	W	MER
	OTHER INSTITUTIONAL USES									
·20	Library or museum, not conducted ID for profit and not accessory to a use listed under Use Item No. 16A, 18, 22, 23, or 24 (·As amended on July 9, 1973, October 19, 1978, April 11, 1979, October 31, 1980, and January 8, 1982)	A	A	A	A	A	A	A	C	F
↔20A	Library or museum not conducted for profit, and accessory to a use listed under Use Item No. 16A, 18, 22, 23, or 24, whether or not in the same lot *Except A if accessory to Use Item No. 22 and if at least one of the provisos in the footnote of Use Item 22 is met. (↔As inserted on January 8, 1982)	C*	C*	C*	C*	C*	C*	C*	C*	F

NOTE: A=ALLOWED, C=CONDITIONAL, F=FORBIDDEN

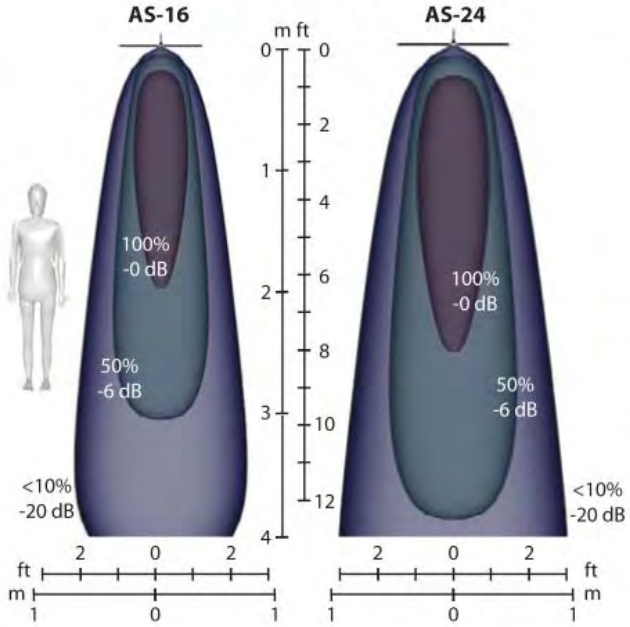
THE PRECEDING EXCERPT QUALIFIES PROPERTIES ZONED AS “H” AS ALLOWING BOTH MUSEUMS AND LIBRARIES, WHICH IS THE MOST SIGNIFICANT PROGRAM PRESENT IN THIS THESIS

AUDIO SPOTLIGHT TECHNICAL INFORMATION

audiospotlight®

Technical Specifications

Sound Field Distribution



Sound field distribution is shown with equal-loudness contours for a standard 1 kHz tone. The center area is loudest at 100% amplitude, while the sound level just outside the illustrated beam area is less than 10%.

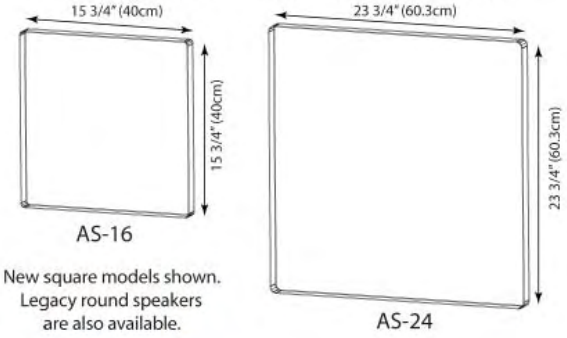
Audio Spotlight systems are much less sensitive to listener distance than traditional loudspeakers, but maximum performance is attained at roughly 1-2m (3-6 ft) from the listener.

Typical levels are 80 dB SPL at 1kHz for AS-16, and 85 dB SPL for AS-24 models. The larger AS-24 can output about twice the power and has twice low-frequency range of the AS-16.

Amplifier Specifications

Input:	RCA line-level audio
Power draw:	65W max (AS-24) 25W max (AS-16)
Output:	BNC coax cable (25' / 7m included)
Controls:	Volume, tone, on/off
Voltage:	100-240V 50/60Hz
Dimensions:	6"w x 7"d x 1.6"h (15cm x 18cm x 4cm)

Speaker Dimensions (thickness ~0.5" / 1cm)



New square models shown. Legacy round speakers are also available.

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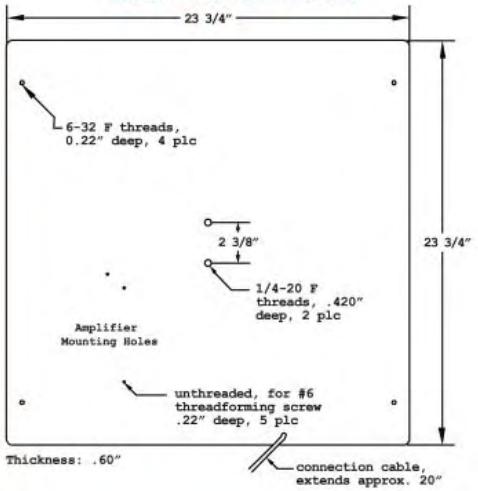
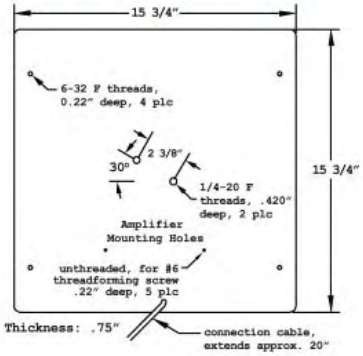
Speaker and Amp Dimensions

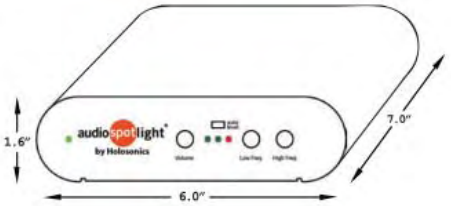
AS-24 - Rear Dimensions



AS-16 - Rear Dimensions



Amplifier Dimensions



Dimensions and Weights

AS-16 Speaker

Dimensions: 15.75" x 15.75" x 0.75"
40 cm x 40 cm x 1.9 cm
Weight: 5.5 lbs (2.5 kg)

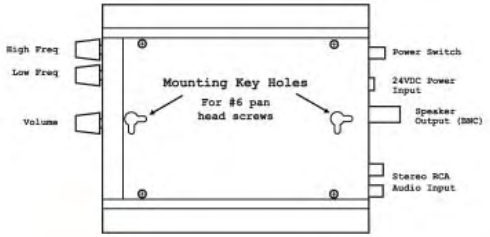
AS-24 Speaker

Dimensions: 23.75" x 23.75" x 0.60"
60.3 cm x 60.3 cm x 1.5 cm
Weight: 12.5 lbs (6 kg)

Amplifier

Dimensions: 6.0" x 7.0" x 1.6"
15 cm x 18 cm x 4.0 cm
Weight: 2.25 lbs (1 kg)

Amplifier - Bottom Panel



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